SOIL SURVEY OF

Palm Beach County Area, Florida

United States Department of Agriculture
Soil Conservation Service
in cooperation with
University of Florida
Institute of Food and Agricultural Sciences
Agricultural Experiment Stations
Soil Science Department

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1968-1974. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1974. This survey was made cooperatively by the Soil Conservation Service; the University of Florida's Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; and Palm Beach County Board of County Commissioners. It is part of the technical assistance furnished to the Palm Beach-Broward Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and ranches; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

Soils of Palm Beach County Area are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by a symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay on the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have slight limitations for a given use can be colored green, those that have moderate limitations can be colored yellow, and those that have severe limitations can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussion of the capability grouping.

Wildlife managers and others can find information about soils and wildlife in the section "Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and recreation areas in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about the soils in the section "Formation and Classification of Soils."

Newcomers in Palm Beach County Area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the end of the publication.

Cover: This golf course is on Quartzipsamments, shaped, as are many of the golf courses in Palm Beach County Area.

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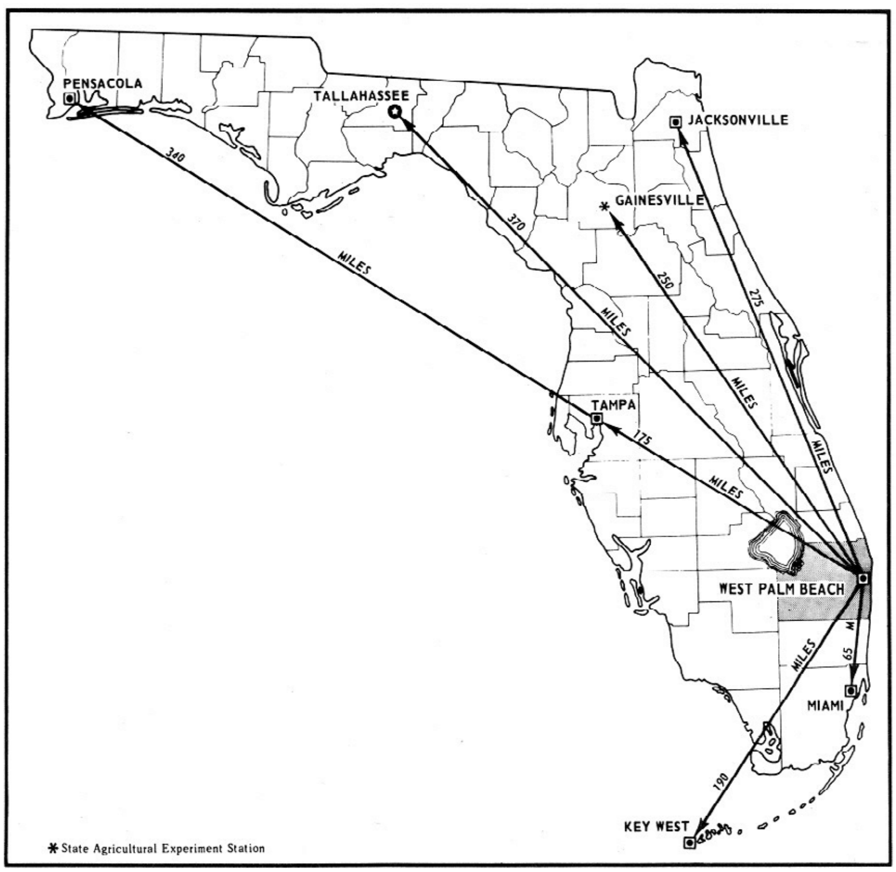

Location of Palm Beach County Area in Florida.

SOIL SURVEY OF PALM BEACH COUNTY AREA, FLORIDA

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PALM BEACH COUNTY AREA is in the southeastern part of Florida, bordering on the Atlantic Ocean. West Palm Beach is the county seat. The survey area, which includes all of Palm Beach except the conservation areas, covers 1,093,480 acres, or 1,708 square miles. The conservation areas, however, are included in the aerial photograph coverage of the detailed soil maps. Palm Beach County Area is bordered by Broward County on the south, Hendry County on the west, and Martin County on the north. Lake Okeechobee, the second largest freshwater lake in the United States, is in the northwest corner of the survey area.

The survey area is mostly low, nearly level land. It is divided into two general areas: sand in the eastern part and muck in the Everglades, which is the largest single body of organic soils in the world. Elevation ranges from 10 to 20 feet above sea level in the eastern areas, and from 10 to 15 feet in the Everglades. The highest point, 53 feet, is on the coastal ridge north of Juno Beach.

The average annual temperature is 75° F. The average annual rainfall is 62 inches, occurring mostly between May and November.

The Palm Beach County Area had a population of about 428,000 in July 1973. Most people live in the coastal area. Rapid urban expansion in this part of the survey area is causing an equally rapid reduction in the acreage being farmed.

Production of sugarcane and beef cattle has been increasing annually on the organic soils in the survey area. Also, production of winter vegetables, for which Palm Beach County Area is nationally known, continues to be important.

Few areas in Palm Beach County Area are used for woodland or range. Pulpwood is occasionally shipped from the survey area, usually when a large tract of pineland is cleared for new development. Stumps from former logging operations are shipped out occasionally. Native range is used by cattlemen in only a few places, mostly in the northern part.

The warm climate, ocean beaches, and recreation facilities are attractive to retired people and tourists, who are important to the Palm Beach County Area.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Palm Beach County Area, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared the profiles with others in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. Riviera and Pahokee, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Riviera sand, depressional, is one of several phases within the Riviera series.

After a guide for classifying and naming the soils

had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Palm Beach County Area: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. An example is Canaveral-Urban land complex.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Basinger and Myakka sands, depressional, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called miscellaneous areas and are given descriptive names, such as "Urban land," which is a miscellaneous area in Palm Beach County Area.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

However, only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups, such as farmers, managers of woodland and rangeland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Palm Beach County Area. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in Palm Beach County Area, who want to compare different parts of the survey area, or who want to locate large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area or in planning engineering works, recreation facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting the site for a road, building, or other structure because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in Palm Beach County Area have been grouped into four general kinds of landscapes for broad interpretative purposes. Each of the broad groups and their included soil associations are described in the following pages.

Table 1 (at the back of this survey) shows the soil ratings and limitations and features affecting selected uses, by soil association, for sanitary facilities, building site development, recreational development, construction material, and water management. For a discussion of the uses of the soils, and explanation of the rating system, and a definition of the key phrases used in Table 1, see the section, "Engineering."

Nearly Level to Sloping, Excessively Drained to Somewhat Poorly Drained Soils of the Coastal Ridges

The three associations in this group consist mainly of nearly level to sloping, excessively drained soils that are sandy to a depth of 80 inches or more, but there are also moderately well drained to somewhat poorly drained soils that are mixtures of sand and shell fragments. Many areas have been modified and are in urban use. These associations are mostly along the eastern coast of Palm Beach County Area.

1. St. Lucie-Urban land-Paola association

Nearly level to sloping, excessively drained soils that are sandy throughout; mostly in urban use

This association is on the mainland along the coast. It is made up of low ridges and knolls that are part of the coastal ridge. The natural vegetation is sand pine, scrub oak, and undergrowth of saw-palmetto, rosemary, cacti, and native grasses.

This association makes up about 3 percent of the survey area. It is about 58 percent St. Lucie soils and Urban land, 7 percent Paola soils, and 35 percent minor soils.

St. Lucie soils are nearly level to sloping and are excessively drained. Typically, they have a thin surface layer of gray sand. Below that is white sand that extends to a depth of more than 80 inches.

Urban land is made up of areas where streets, buildings, parking lots, and other structures cover more than 75 percent of the land. In residential areas, streets, houses, sidewalks, and other structures cover 25 to 50 percent of the land.

Paola soils are nearly level to sloping and are excessively drained. Typically, they have a thin surface layer of dark gray sand and a subsurface layer of white sand. The subsoil is strong brown sand in the upper part and light yellowish brown sand in the lower part.

The minor soils in this association are Pomello, Immokalee, Basinger, and Placid soils. Some of these have been graded or filled in for urban use.

Much of this association is in urban use, but some large areas in the northern part are in native vegetation. Farming is not important because of the rapid urban expansion and because the major soils are not suited or poorly suited to most crops. Limitations are slight for many urban uses. The major soils have severe limitations for structures designed for holding water, disposing of refuse material, and recreation development.

2. Palm Beach-Urban land-Canaveral association

Nearly level to sloping, excessively drained, moderately well drained and somewhat poorly drained soils that are sandy throughout; mostly in urban use

This association is on the offshore island that is along most of the coastline. It is made up of long, narrow ridges and lowlands. The natural vegetation is cabbage palm, seagrape, scrub live oak, cacti, sea oats, and other native grasses.

This association makes up about 1 percent of the survey area. It is about 16 percent Palm Beach soils and Urban land, 16 percent Canaveral soils, and 68 percent minor soils.

Palm Beach soils are nearly level to sloping and are excessively drained. They are deep, sandy soils that have a high content of fine shell fragments throughout. Typically, they have a surface layer of dark grayish brown. It overlies a thick pale brown layer. Below this is a light yellowish brown layer that extends to a depth of more than 80 inches. In many places Palm Beach soils have been modified for urban or other uses by grading or shaping.

Urban land is made up of areas where streets, buildings, parking lots, and other structures cover more than 75 percent of the land and of residential areas, where streets, houses, or other structures cover 25 to 50 percent of the land.

Canaveral soils are nearly level and are moderately well drained to somewhat poorly drained. Typically, they have a surface layer of dark grayish brown sand and shell fragments over layers of pale brown and very pale brown sand and shell fragments that extend below a depth of 65 inches. Canaveral soils are developed for urban use.

The minor soils in this association are Beaches, Cocoa soils, and Quartzipsamments, shaped. Some of these have been filled, graded, and shaped for urban use.

Much of this association is being used for homes, large condominiums, shopping centers, and other urban uses. Some large areas in the northern part are in native vegetation.

Farming is not important because of rapid urban expansion and because the major soils are poorly suited to most crops. Limitations are slight for many urban uses. The major soils have severe limitations for structures designed for holding water, disposing of refuse, and recreation development.

3. Quartzipsamments-Urban land association

Nearly level to sloping, excessively drained soils that are sandy throughout and areas developed for urban use

This association is made up of soils that have been filled, graded, shaped, or generally altered for urban development. It is in the eastern part of the survey area. There is no natural vegetation.

This association makes up about 1 percent of the survey area. It is about 45 percent Quartzipsamments, shaped, 45 percent Urban land, and the rest is minor soils and miscellaneous areas.

Quartzipsamments, shaped, are nearly level to gently sloping and are well drained. Typically, they are sandy to a depth of 80 inches or more; soil layers vary widely in color and occur in no regular sequence.

Urban land consists of areas that are more than 70 percent covered by houses, streets, parking lots, and buildings.

The minor areas in this association consist of Adamsville, organic subsoil variant, Pits, and Udorthents covering sanitary landfills.

Much of this association is being used for homes, airports, golf courses, shopping centers, business and industrial areas, and other urban uses; thus, the soils have no importance for farming. The major soils have slight limitations for many urban uses. They have severe limitations for structures designed to retain or hold water or to dispose of refuse materials and for recreation developments.

Nearly Level to Gently Sloping, Poorly Drained and Moderately Well Drained Soils of the Flatwoods, Generally Not Subject to Flooding

The five associations in this group consist mainly of nearly level, poorly drained soils and nearly level to gently sloping, moderately well drained soils on low

ridges, all of which have a weakly cemented layer in the subsoil; and nearly level, poorly drained soils that have a loamy subsoil. Most areas of these soils are not subject to flooding, but small scattered areas in sloughs and depressions are frequently flooded. These associations are mostly in the eastern third of the county, just west of the coastal ridge.

4. *Pomello-Immokalee association*

Nearly level to gently sloping, moderately well drained and poorly drained soils that are sandy throughout and have a weakly cemented layer below a depth of 30 inches

This association is in areas just west of the coastal ridge. It is made up of low knolls and ridges and broad flatwoods areas interspersed with sloughs and small depressions or ponds. The natural vegetation is slash pine, sand pine, scrub oak, saw-palmetto, inkberry, runner oak, pineland three-awn, and other native grasses.

This association makes up about 1 percent of the survey area. It is about 50 percent Pomello soils, 25 percent Immokalee soils, and 25 percent minor soils.

Pomello soils are nearly level to gently sloping and are moderately well drained. Typically, they have a thin surface layer of gray fine sand and a thick subsurface layer of light gray to white fine sand. Black fine sand, weakly cemented with organic matter is at a depth of 44 inches. Next is a thin layer of dark reddish brown fine sand and below that is light yellowish brown fine sand that extends to a depth of more than 80 inches. Some areas have been modified for urban use.

Immokalee soils are nearly level and are poorly drained. Typically, they have a thin surface layer of black and dark fine sand over layers of gray and light gray fine sand. Below a depth of 37 inches is a layer of black and very dark gray fine sand over a thick layer of black fine sand, weakly cemented with organic matter. Below that is dark reddish brown and brown fine sand.

The minor soils are Myakka, Basinger, and Placid soils and Urban land.

Much of this association is in native vegetation. A few small areas are used for cultivated crops or improved pasture, and other areas are used for golf courses, subdivisions or other urban uses. Such urban development is rapidly expanding, and farming is diminishing in importance. The major soils are not suited or are moderately well suited to cultivated crops, primarily because of either droughtiness or a high water table. They are poorly suited to well suited to improved pasture. They have severe limitations for most urban uses. Fill material is needed to make some areas suitable for most urban uses.

5. *Myakka-Immokalee-Basinger association*

Nearly level, poorly drained soils that are sandy throughout; some have a weakly cemented layer

This association is in the eastern quarter of the county and is moderately extensive. It is made up of broad, flatwood areas interspersed with grassy sloughs and many shallow depressions or ponds. The natural vegetation is slash pine, saw-palmetto, inkberry, fetterbush, southern bayberry, pineland three-awn, and other native grasses. Water-tolerant grasses and water plants grow in low, wet areas. Cypress trees are in some of these low, wet areas.

This association makes up about 8 percent of the survey area. It is about 45 percent Myakka soils, 25 percent Immokalee soils, 25 percent Basinger soils, including depressional phases, and 5 percent minor soils.

Myakka soils are nearly level and are poorly drained. Typically, they have a surface layer of black sand over layers of gray sand. A layer of black sand is at a depth of 26 inches, and a layer of dark reddish brown sand is below that. These layers are weakly cemented with organic matter. Next, a layer of dark brown sand overlies a layer of pale brown sand. Myakka soils in depressions are covered with water for long periods.

Immokalee soils are nearly level and poorly drained. Typically, they have a thin surface layer of black and dark gray fine sand over thick layers of gray and light gray fine sand. A layer of black and very dark gray fine sand is at a depth of 37 inches. It overlies thick layers of black fine sand that are weakly cemented with organic matter. Below that is dark reddish brown and brown fine sand.

Basinger soils are nearly level and poorly drained. Typically, they have a thin surface layer of light gray fine sand and a thick subsurface layer of white fine sand. Below this are layers of dark grayish brown fine sand and dark reddish brown fine sand that are stained with organic matter. Below this is pale brown fine sand to a depth of 72 inches or more. Basinger soils in depressions are covered with water for long periods.

The minor soils in this association are Placid and Anclote soils and Myakka soils in areas of urban development.

Much of this association is used for improved pasture and cultivated crops. Some large areas, especially in the northern part, are in natural vegetation. Urban development is rapidly expanding, and farming is diminishing in importance. Drainage and water control have been established over large areas. The major soils are not suited or are poorly suited to cultivated crops, but with adequate water control they are moderately well suited to a variety of truck crops. With simple drainage they are well suited to improved pasture. The major soils have severe limitations for most urban uses. Water control is needed to overcome wetness, and fill material is needed to make some areas suitable for building sites (fig. 1).

6. *Immokalee-Urban land-Pompano-Basinger association*

Nearly level, poorly drained soils that are sandy throughout; some have a weakly cemented layer below a depth of 30 inches; mostly in urban use

This association is only in areas west of the coastal ridge. It is made up of broad, low flatwoods, interspersed with grassy flatlands and marshy sloughs. The natural vegetation is slash pine, saw-palmetto, inkberry, pineland three-awn, and other grasses in the flatwoods areas. The lower flatlands have southern bayberry, scattered cabbage palm, and a wide variety of

***Figure 1.*—This subdivision is in an area of Myakka-Immokalee-Basinger association. Some areas of this association may be flooded after heavy rainfall unless adequate drainage is provided.**

grasses. Maidencane, sawgrass, and other water-tolerant plants are in most slough areas.

This association makes up about 1 percent of the survey area. It is about 50 percent Immokalee soils and Urban land, 25 percent Pompano soils, 20 percent Basinger soils, and 5 percent minor soils.

Immokalee soils are nearly level and are poorly drained. Typically, they have a thin surface layer of black and dark gray fine sand over thick layers of gray to light gray fine sand. A layer of black and very dark gray fine sand is at a depth of 37 inches, and below that is a thick layer of black fine sand, which is weakly cemented with organic matter. Next is dark reddish brown and brown fine sand. Some large areas of Immokalee soils have been modified for urban development by spreading about 12 inches of sandy fill material on the surface.

Urban land is made up of areas where houses, shopping centers, parking lots, large buildings, streets, and sidewalks cover more than 70 percent of the land. Few areas remain where the natural soil can be observed.

Pompano soils are nearly level and are poorly drained. Typically, their surface layer is dark grayish brown fine sand. It overlies layers of light gray, pale brown, and very pale brown fine sand that extend to a depth of more than 80 inches.

Basinger soils are also nearly level and are poorly drained. Typically, they have a thin surface layer of light gray fine sand and a thick subsurface layer of fine sand. Layers of dark grayish brown fine sand and dark reddish brown fine sand that is stained with organic matter are between depths of 25 and 36 inches. Below this is pale brown fine sand that extends to a depth of 72 inches or more.

The minor soils are Myakka, Placid, and Sanibel soils.

Much of this association is developed for urban use. Much of the natural vegetation has been removed. Farming is not important because of urban development. Drainage and water control established in most of this area helps to overcome wetness that affects urban uses. Wetness remains a problem in areas lacking water control.

7. *Wabasso-Riviera-Oldsmar association*

Nearly level, poorly drained sandy soils that have a loamy subsoil; some have a weakly cemented sandy layer over the loamy subsoil

This association is in areas east of the Everglades and west of the coastal ridge. It is made up of broad flatwoods and grassy sloughs interspersed with many small to large ponds and swampy areas. The natural vegetation is slash pine, scattered cabbage palm, and undergrowth of saw-palmetto, waxmyrtle, inkberry, pineland three-awn, and other native plants. In sloughs and swampy areas, the vegetation is cypress, melaleuca, corkweed, St. Johnswort, needlegrass, sand cordgrass, and other water-tolerant plants.

This association makes up about 3 percent of the survey area. It is about 35 percent Wabasso soils, 35

percent Riviera soils, including depressional phases, 25 percent Oldsmar soils, and about 5 percent minor soils.

Wabasso soils are nearly level and are poorly drained. Typically, they have a surface layer of black fine sand and a subsurface layer of gray and light gray fine sand. A black fine sand layer is at a depth of about 22 inches. This layer is weakly cemented with organic matter. Below this the subsoil is brown and very dark grayish brown fine sandy loam. The underlying material is light gray sand and shell fragments.

Riviera soils are nearly level and are poorly drained. Typically, they have a thin surface layer of dark grayish brown sand and a thick subsurface layer of white sand that tongues into the underlying subsoil. The subsoil is grayish brown sandy loam, and it overlies layers of gray sand mixed with shell fragments. Riviera soils in depressions are similar but are covered with water for long periods.

Oldsmar soils are nearly level and are poorly drained. Typically, they have a thin surface layer of very dark gray sand and a thick subsurface layer of grayish brown and white sand. A layer of black sand, cemented with organic matter, is at a depth of 34 inches. Below this the subsoil is a thin layer of dark grayish brown sandy loam over a thin layer of brown loamy sand. Below this is mixed sand and shell fragments.

The minor soils in this association are Pineda, Pinellas, Boca, Oldsmar, and Holopaw soils.

Much of this association, especially in the northern part, is in native vegetation. Some large areas are used for cultivated crops and improved pasture. A few small areas are used for citrus. A high water table severely limits the major soils for most farm uses. With adequate water control, these soils are well or moderately well suited to citrus, truck crops, and improved pasture. The major soils have severe limitations for most urban uses. Drainage is needed to overcome wetness, and fill material is needed to make some areas suitable for building sites.

8. Boca-Hallandale association

Nearly level, poorly drained sandy soils that are moderately deep to shallow over limestone; some have a loamy subsoil

This association is only in the southeastern part of the survey area along the county line. It is made up of broad, low flatwoods interspersed with grassy flats. The natural vegetation is slash pine, cabbage palm, saw-palmetto, southern bayberry, inkberry, pineland three-awn, and other grasses. Cypress trees grow in the wetter areas.

This association makes up only about 1 percent of the survey area. It has a higher percentage of rock outcrops and soils shallow to rock than any other association. It is about 60 percent Boca soils, 35 percent Hallandale soils, and 5 percent minor soils.

Boca soils are nearly level and are poorly drained. Typically, they have a surface layer of very dark gray fine sand over thick layers of light brownish gray and light gray fine sand. A dark grayish brown sandy clay loam subsoil is at a depth of 29 inches. Hard limestone that has numerous solution holes is at a depth of 36 inches.

Hallandale soils are nearly level and are poorly drained. Typically, they have a surface layer of dark gray sand over very pale brown sand. Hard limestone that has numerous fractures and solution holes is at a depth of 15 inches.

The minor soils in this association are Riviera, Jupiter, and Pompano soils.

Much of this association is in native vegetation. Some areas are used for truck crops and improved pasture. Drainage and water control have been established in most areas and help to overcome the wetness limitation for most uses. Shallowness to rock is a severe limitation to most cultivated crops. With good management these soils are well suited to selected truck crops and improved pasture. The major soils have severe limitations for most urban uses.

Nearly Level, Poorly Drained and Very Poorly Drained Soils Generally in Sloughs and Depressions, Subject to Frequent Flooding

The four associations in this group consist mainly of nearly level, poorly and very poorly drained soils that have a loamy subsoil, some of which have a thin organic surface layer; poorly drained sandy soils; and poorly drained soils that rest on limestone. These soils are mostly in low sloughs and depressions that are covered with water for long periods. These associations are mostly in the east central part of Palm Beach County Area.

9. Riviera association

Nearly level, poorly drained sandy soils that have a loamy subsoil

This association is in the central and northern parts of the survey area east of the Everglades and is extensive in these areas. It is made up of broad, low flatwoods and grassy sloughs interspersed with numerous grassed ponds and swampy areas. The natural vegetation is slash pine, cabbage palm, saw-palmetto, southern bayberry, inkberry, pineland three-awn, and other native grasses. Cypress, pickerelweed, St. Johnswort, corkweed, sand cordgrass, and other wetland grasses grow in wet areas.

This association makes up about 16 percent of the survey area. It is about 70 percent Riviera soils and 30 percent minor soils.

Riviera soils are nearly level and are poorly drained. Typically, they have a thin surface layer of dark grayish brown sand. A thick subsurface layer of white sand tongues into a subsoil of grayish brown sandy loam to a depth of about 36 inches. Gray sand mixed with shell fragments is below a depth of about 42 inches. Riviera soils in depressions are covered with water for long periods.

The minor soils in this association are Holopaw, Oldsmar, Pineda, Pinellas, Boca, and Hallandale soils.

Much of this association is in natural vegetation. Other areas are used for citrus, cultivated crops, and improved pasture. The major soils are severely limited for most farm uses by a high water table. With adequate water control, these soils are well suited to citrus,

truck crops, and improved pasture. The major soils have severe limitations for most urban uses. Water control is necessary for most uses, and fill material is needed to make some areas suitable for building sites.

10. Riviera-Boca association

Nearly level, poorly drained sandy soils that have a loamy subsoil; some are moderately deep over limestone

This association is in the eastern part of the survey area between the coastal ridge and the Everglades. It is made up of broad, low flatwoods interspersed with grassy sloughs, ponds, and swampy areas. The natural vegetation is slash pine, cabbage palm, saw-palmetto, southern bayberry, inkberry, pineland three-awn, and other native grasses. Cypress, pickerelweed, St. Johnswort, and needlegrass grow in most wet areas.

This association makes up about 4 percent of the survey area. It is about 45 percent Riviera soils, 40 percent Boca soils, and 15 percent minor soils.

Riviera soils soils are nearly level and are poorly drained. Typically, they have a thin surface layer of dark grayish brown sand. A thick subsurface layer of white sand tongues into a subsoil of grayish brown sandy loam. Below that, gray sand is mixed with shell fragments. Riviera soils in depressions are covered with water for long periods.

Boca soils are nearly level and are poorly drained. Typically, they have a thin surface layer of very dark gray fine sand over thick layers of light brownish gray and light gray fine sand. A thin subsoil of brown sandy clay loam is at a depth of 29 inches. Below this, a thin layer of soft marl rests on limestone at a depth of 36 inches.

The minor soils in this association are Pineda, Holopaw, Pinellas, and Hallandale soils.

Much of this association is in native vegetation. Some of it is used for cultivated crops, citrus, and improved pasture. The major soils are severely limited for most farm uses by a high water table. With adequate water control, these soils are well suited to truck crops, citrus, and improved pasture. These soils have severe limitations for most urban uses. Drainage is needed to overcome wetness, and fill material is needed to make some areas suitable for building sites.

11. Basinger association

Nearly level, poorly drained soils that are sandy throughout

This association is in the eastern part of the survey area near the coastal ridge. It is made up of broad, low wetlands that have scattered areas of slightly higher flatwoods and lower swampy and marshy areas. The natural vegetation is southern bayberry, St. Johnswort, broomsedge, bluestem, sand cordgrass, pineland three-awn, maidencane, and other grasses. Slash pine, cabbage palm, and saw-palmetto grow in higher areas. Cypress, melaleuca, sawgrass, and other grasses and sedges grow in lower areas.

This association makes up about 3 percent of the survey area. It is about 60 percent Basinger soils and 40 percent minor soils.

Basinger soils are nearly level and are poorly drained. Typically, they have a thin surface layer of light gray fine sand and a thick subsurface layer of white fine sand. Layers of dark grayish brown and dark reddish brown fine sand stained with organic matter are below a depth of 25 inches. Below these, pale brown fine sand extends to a depth of 72 inches or more. Basinger soils in depressions are covered with water for long periods.

The minor soils in this association are Myakka, Immokalee, Pompano, Anclote, Sanibel, and Okeelanta soils and Basinger soils in areas of urban development.

Much of this association is in natural vegetation. Some areas are in improved pasture and cultivated crops. Urban development is rapidly expanding, and farming is diminishing in importance. Drainage and water control have been established over large areas. The major soils are poorly suited to cultivated crops. Adequate water control is needed for this use. With simple drainage, the major soils are suited to improved pasture. The soils in depressions are not suited to such uses. The major soils have severe limitations for most urban uses. Water control and fill material are needed to make them suitable for building sites.

12. Winder-Tequesta association

Nearly level, poorly drained and very poorly drained sandy soils that have a loamy subsoil; some have a thin layer of muck at the surface

This association is in the Loxahatchee Slough area in the northeastern part of the survey area. It is made up of broad, low flats, depressions, and drainageways. The natural vegetation is cypress, needlegrass, maidencane, Southern bayberry, pickerelweed, and other water-tolerant plants.

This association makes up about 1 percent of the survey area. It is about 40 percent Winder soils, 40 percent Tequesta soils, and 20 percent minor soils.

Winder soils are nearly level and are poorly drained. Typically, they have a thin surface layer of black fine sand and a subsurface layer of light gray and light brownish gray fine sand. The subsoil is gray fine sandy loam that has sandy tongues from the subsurface layer. Below this, a thin layer of gray loamy fine sand rests on gray fine sand mixed with white shell fragments.

Tequesta soils are nearly level and are very poorly drained. Typically, they have a 12-inch layer of black muck (sapric material) at the surface. The surface layer is dark gray fine sand, and below that there is a thick layer of dark grayish brown fine sand. Next, the subsoil is grayish brown fine sandy loam that has tongues of fine sand from the layer above. It overlies mixed sand and shell fragments.

The minor soils in this association are Riviera, Hallandale, Chobee, Pinellas, Holopaw, and Okeelanta soils.

Most of this association is in native vegetation. A large area is used as a water catchment for the city of West Palm Beach. A few areas are used for improved pasture. This association is in a broad, natural drainageway, and the soils are subject to flooding for long periods. This hazard severely limits their use for farming. With adequate water control, the major soils are well suited to truck crops and improved pasture. The hazards of flooding and wetness also severely limit these soils for most urban uses. Drainage and fill material on the surface of the soils are needed to overcome these

limitations. Organic layers on the surface should be removed and replaced with fill material to make the soils suitable for building sites.

Nearly Level, Very Poorly Drained Organic Soils of the Everglades

The three associations in this group consist mainly of nearly level, very poorly drained organic soils, some of which rest on limestone. These associations are in the western part of Palm Beach County Area.

13. Terra Ceia association

Nearly level, very poorly drained, well decomposed organic soils that are more than 51 inches thick

This association is in the Everglades area which occupies the western two-thirds of the survey area. It is made up of broad, freshwater marshes. The natural vegetation is dominantly sawgrass. Willow, sweetbay, and cypress grow in scattered areas. Low-growing plants are pickerelweed, ferns, sedges, and native grasses.

This association makes up about 26 percent of the survey area. It is about 75 percent Terra Ceia soils, and 25 percent minor soils.

Terra Ceia soils are nearly level and are very poorly drained. Typically, they have a surface layer of black muck (sapric material). Below that is dark reddish brown muck that extends to a depth of 65 inches or more.

The minor soils in this association are Pahokee, Okeelanta, Okeechobee, and Torry soils.

Most of this association is used for growing sugarcane. Other areas are used for cultivated crops, sod production, and improved pasture. A large area west of Conservation Area 2A and scattered areas in the southwestern corner of the survey area are in native vegetation. With drainage and adequate water control, the soils are well suited to vegetable crops, sugarcane, and improved pasture. The soils have severe limitations for urban uses because of wetness, flooding, and organic material. The organic material has low strength and is subject to oxidation and subsidence when it is not saturated with water. For houses and other urban developments, the organic material should be removed and replaced with fill material.

14. Pahokee association

Nearly level, very poorly drained organic soils that are 36 to 51 inches thick over limestone

This association is primarily in the central and southern parts of the Everglades. It occupies the western two-thirds of the survey area. It is made up of broad, freshwater marsh areas. The natural vegetation is dominantly sawgrass. Willow, sweetbay, and cypress grow in scattered areas. Low-growing plants are ferns, pickerelweed, sedges, and native grasses.

This association makes up about 27 percent of the survey area. It is about 85 percent Pahokee soils and 15 percent minor soils.

Pahokee soils are nearly level and are very poorly drained. Typically, they have a surface layer of black muck (sapric material). Below this is black and dark reddish brown muck that rests on hard limestone at a depth of 42 inches.

The minor soils in this association are Lauderhill, Terra Ceia, and Okeelanta soils.

Most of this association is used for growing sugarcane. Some areas are in truck crops, sod production, and improved pasture. A large area in the southwestern part of the county is in native vegetation. With drainage and water control these soils are well suited to vegetables, sugarcane, and improved pasture. The limestone bedrock must be removed by blasting for drainage and water control, which are necessary for most farm uses. The soils have severe limitations for urban uses because of wetness, flooding, and organic material. The organic material has low strength and is subject to oxidation and subsidence when it is not saturated with water. The organic material should be removed and replaced with fill material if the soils are to be used for houses and other urban developments.

15. Torry association

Nearly level, very poorly drained organic soils that are more than 51 inches thick over limestone

This association is only in the vicinity of Lake Okeechobee near the southern and eastern shores. It is made up of broad, freshwater marshes. No native vegetation is in this association.

This association makes up about 4 percent of the survey area. It is about 85 percent Torry soils and 15 percent minor soils.

Torry soils are nearly level and are very poorly drained. Typically, they have a surface layer of black muck (sapric material). Below this is a layer of sticky black muck. These layers have a high mineral content. Below this is a thick layer of black muck that rests on limestone at a depth of about 65 inches.

The minor soils in this association are Terra Ceia and Pahokee soils.

Most of this association is used for growing sugarcane. Other areas are used for truck crops and improved pasture. A few areas are used for urban purposes. With drainage and adequate water control, these soils are well suited to vegetables, sugarcane, and improved pasture. The soils have severe limitations for urban uses because of wetness and organic material. The organic material has low strength and is subject to oxidation and subsidence when it is not saturated with water. The organic material should be removed and replaced with suitable fill material if the soils are to be used for houses and other urban developments.

Descriptions of the Soils

In this section the soils of Palm Beach County Area are described in detail, and their use and management are discussed. Each soil series and the mapping units in that series are described. Unless specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the de-

scription of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is detailed and is for those who need to make thorough and precise studies of soils. Color terms are for moist soil unless otherwise stated. The profile described in the soil series is representative of mapping units in that series. If a mapping unit has a profile different from the one described in the series, the differences are stated in the description of the mapping unit, or they are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Quartzipsamments, shaped, for example, do not belong to a soil series. The pedons described for these soils are referred to as "reference pedons." They have the essential characteristics of the majority of pedons in the mapping unit but the arrangement and properties of the layers may vary considerably.

Preceding the name of each mapping unit is a symbol that identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit. No capability unit is given for those soils for which present land use precludes use for agriculture.

The acreage and proportionate extent of each mapping unit are shown in table 2. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (7).[1]

Adamsville Variant

The Adamsville variant is a nearly level to gently sloping, somewhat poorly drained soil that has sandy layers overlying muck. This soil formed in sandy material that was deposited by wave action in Lake Okeechobee on an organic soil that has a high clay content. It occurs as long, low, narrow, natural dikes or ridges bordering the eastern shore of Lake Okeechobee. The water table is at a depth of 20 to 40 inches for 4 to 6 months in most years.

In a representative pedon the surface layer is very dark gray sand about 2 inches thick. Layers of light gray and white sand are between depths of 2 and 36 inches. Below this, black muck with a high clay content extends to a depth of 65 inches.

Permeability is rapid in the sandy layers and moderate in the muck. The available water capacity is very low in the sandy layers and very high in the muck. The organic-matter content and natural fertility are low in the sandy layers.

Representative pedon of Adamsville sand, organic subsoil variant, about 0.2 mile east of Lake Okeechobee and 100 feet east of U.S. Highway 441 in Pahokee, Florida, SW1/4SW1/4 sec. 8, T. 42 S., R. 37 E.

A—0 to 2 inches; very dark gray (10YR 3/1) sand; weak fine granular structure; very friable; many uncoated sand grains; many fine roots; neutral; clear smooth boundary.

C1—2 to 10 inches; gray (10YR 6/1) sand; single grained; loose; neutral; clear smooth boundary.

[1] Numbers in parentheses refer to Literature Cited, page 93.

TABLE 2.—*Acreage and proportionate extent of the soils*

Map symbol	Soil name	Acres	Percent
AdB	Adamsville sand, organic subsoil variant	422	[1]
An	Anclote fine sand	2,000	0.2
ASF	Arents, very steep	180	[1]
AU	Arents-Urban land complex	10,183	0.9
AX	Arents-Urban land complex, organic substratum	3,176	0.3
Ba	Basinger fine sand	31,485	2.9
Bc	Basinger-Urban land complex	3,382	0.3
BM	Basinger and Myakka sands, depressional	12,297	1.1
Bn	Beaches	928	0.1
Bo	Boca fine sand	30,131	2.8
Cc	Canaveral-Urban land complex	1,997	0.2
Ch	Chobee fine sandy loam	1,609	0.1
CuB	Cocoa-Urban land complex	683	0.1
Da	Dania muck	1,356	0.1
Fa	Floridana fine sand	2,167	0.2
Ha	Hallandale sand	6,298	0.6
Ho	Holopaw fine sand	16,405	1.5
Im	Immokalee fine sand	30,530	2.8
Ju	Jupiter fine sand	1,730	0.2
La	Lauderhill muck	28,641	2.6
Mk	Myakka sand	44,673	4.1
Mu	Myakka-Urban land complex	3,211	0.3
Oc	Okeechobee muck	15,983	1.5
On	Okeelanta muck	22,120	2.0
Os	Oldsmar sand	16,135	1.5
Pa	Pahokee muck	266,708	24.4
PbB	Palm Beach-Urban land complex	1,825	0.2
PcB	Paola sand, 0 to 8 percent slopes	2,360	0.2
Pd	Pineda sand	15,361	1.4
Pe	Pinellas fine sand	6,817	0.6
Pf	Pits	2,446	0.2
Pg	Placid fine sand	708	0.1
PhB	Pomello fine sand	5,792	0.5
Po	Pompano fine sand	3,227	0.3
QAB	Quartzipsamments, shaped	6,996	0.6
Ra	Riviera sand	68,579	6.3
Rd	Riviera sand, depressional	86,089	7.9
Ru	Riviera-Urban land complex	271	[1]
Sa	Sanibel muck	5,054	0.5
ScB	St. Lucie sand, 0 to 8 percent slopes	4,466	0.4
SuB	St. Lucie-Urban land complex	14,649	1.3
Ta	Tequesta muck	7,345	0.7
Tc	Terra Ceia muck	230,224	21.0
TM	Tidal swamp, mineral	602	0.1
TO	Tidal swamp, organic	211	[1]
Tr	Torry muck	42,660	3.9
UD	Udorthents	3,602	0.3
Ur	Urban land	7,454	0.7
Wa	Wabasso fine sand	12,474	1.1
Wn	Winder fine sand	6,682	0.6
	Water areas less than 40 acres in size [2]	3,156	0.3
	Total	1,093,480	100.0

[1] Less than 0.05 percent.
[2] Indicated on soil map by appropriate symbol for pond or lake.

C2—10 to 23 inches; white (10YR 8/1) sand; single grained; loose; neutral; clear smooth boundary.

C3—23 to 36 inches; light gray (10YR 7/1) sand; single grained; loose; common coarse pockets of calcareous shell fragments; neutral; abrupt wavy boundary.

Oab—36 to 65 inches; black (N 2/0) sapric material (muck); massive; sticky, slightly plastic; less than 5 percent fiber, unrubbed; estimated 60 percent mineral material; mildly alkaline, weakly calcareous.

The combined thickness of the A and C horizons ranges from 20 to 40 inches but varies according to position on the low dike or ridge. The thicker areas occur on the ridge crests. Reaction ranges from slightly acid to moderately alkaline in these horizons.

The A horizon is very dark gray (10YR 3/1), dark gray (10YR 4/1), or gray (10YR 5/1) and is 2 to 8 inches thick.

The C horizon is gray (10YR 6/1), light gray (10YR 7/1, 7/2), light brownish gray (10YR 6/2), very pale brown (10YR 7/3) or white (10YR 8/1, 8/2). It consists of layers of variable thickness; the thickness changes within short distances. Reaction ranges from slightly acid to moderately alkaline. In some places, pockets of thin lenses of shell occur in the lower part of this horizon.

The Oab horizon is black (N 2/0) or dark reddish brown (5YR 5/2) sapric material (muck) and is 10 to 36 inches thick. Mineral content ranges from 40 to 70 percent, of which 50 to 80 percent is clay. Reaction is neutral to moderately alkaline.

Adamsville sand, organic subsoil variant, is associated primarily with Torry soils and to a lesser extent with Terra Ceia soils. It differs from both of these soils in that it has a sandy horizon that overlies organic material.

AdB—Adamsville sand, organic subsoil variant. This is a nearly level to gently sloping, somewhat poorly drained soil that occurs as a long, low, narrow natural dike or ridge bordering the eastern shore of Lake Okeechobee. This soil has the pedon described as representative of the series. The water table is within 20 to 40 inches of the surface for 4 to 6 months in most years.

Included with this soil in mapping are areas where the sandy layer above the muck is less than 20 inches thick. These areas are generally transitional to adjacent organic soils.

The natural vegetation is cabbage palms, cypress, and various hardwoods, shrubs, and grasses. Many areas are in natural vegetation, but in the vicinity of Pahokee and Canal Point, this soil has been developed for urban use.

The number of crops adapted to this soil is very limited, unless the soil is drained of periodic wetness. If drained and intensively managed, this soil is well suited to vegetable crops. Providing a well designed, constructed, and maintained water control system that removes excess water in wet periods and subsurface irrigation in dry periods is a major management need. Fertilizer and lime should be applied according to crop needs.

Unless drained, this soil is not suited to citrus. With a well designed drainage system that removes excess water to a depth of about 4 feet, however, it is moderately well suited. Trees should be planted on beds. Regular applications of fertilizer and lime are needed. If rainfall is low, irrigation is necessary to attain the best yields.

This soil is moderately well suited to improved pastures of grass. It requires simple drainage to remove excess surface water in periods of heavy rainfall. Regular use of fertilizer is necessary and some areas require lime. Careful control of grazing is needed to maintain healthy plant growth. Capability unit IIIw-1.

Anclote Series

The Anclote series consists of nearly level, very poorly drained sandy soils in small depressions and poorly defined drainageways. These soils formed in thick beds of sandy marine sediments. The water table is within 10 inches of the surface for 6 months or more in most years and recedes to below a depth of 20 inches in the driest seasons. Depressions are covered with water for 2 to 4 months in most years.

In a representative pedon, the surface layer in the upper 8 inches is black fine sand and in the lower 9 inches it is black and gray fine sand. The underlying material extends to a depth of 62 inches or more and is gray fine sand.

Permeability is rapid in all layers. The available water capacity is medium in the surface layer and low in the underlying material. Natural fertility is moderate.

Representative pedon of Anclote fine sand, 0.5 mile south of Donald Ross Road, 0.25 mile west of Prosperity Farms Road, NW1/4SW1/4 sec. 29, T. 41 S., R. 43 E.

A11—0 to 8 inches; black (N 2/0) fine sand; moderate fine and medium granular structure; very friable; slightly acid; clear wavy boundary.

A12—8 to 17 inches; black (N 2/0) and light gray (10YR 6/1) fine sand, black (10YR 2/1) rubbed; weak fine granular structure; very friable; slightly acid; gradual smooth boundary.

C—17 to 62 inches; gray (10YR 6/1) fine sand; common medium distinct black (10YR 2/1) streaks and mottles in upper few inches; single grained; loose; slightly acid.

Reaction throughout the pedon ranges from medium acid to mildly alkaline. The A11 horizon is black (N 2/0; 10YR 2/1) or very dark gray (N 3/0; 10YR 3/1). It is 4 to 12 inches thick. The organic matter content ranges from 2 to 15 percent. The A12 horizon is black (N 2/0; 10YR 2/1), very dark gray (N 3/0; 10YR 3/1), or very dark grayish brown (10YR 3/2) with few to many streaks and mottles of gray (N 5/0, 6/0; 10YR 5/1, 6/1), and light gray (N 7/0; 10YR 7/1, 7/2). Thickness is 6 to 12 inches. The organic-matter content ranges from 1 to 5 percent.

The C horizon is gray (10YR 6/1), light brownish gray (10YR 6/2), grayish brown (10YR 5/2), or dark grayish brown (10YR 4/2) with few to common mottles of gray or black.

Anclote soils are associated with Sanibel, Pompano, Basinger, Immokalee, Pomello, and Okeelanta soils. Unlike the Sanibel soils, they lack the Oa horizon. They have a thick, black A1 horizon, which Pompano, Basinger, Immokalee, and Pomello soils lack. Anclote soils lack the Bh horizon that Immokalee and Pomello soils have. They are mineral and Okeelanta soils are organic.

An—Anclote fine sand. This is a nearly level, very poorly drained, deep, sandy soil in small depressions and poorly defined drainageways. This soil has the pedon described as representative of the series. The water table is within 10 inches of the surface for 6 months or more in most years and recedes to below a depth of 20 inches in the driest seasons.

Included with this soil in mapping are small areas that have a black surface layer thicker than 24 inches and small areas of Pompano, Basinger, Placid, Sanibel, and Okeelanta soils.

The natural vegetation is cypress, sweetbay, swamp maple, ferns, maidencane, pickerelweed, sawgrass, and other water-tolerant grasses. Most areas of this soil are in natural vegetation or improved grass pasture.

Unless drained, this soil is not suited to cultivated crops. If a water control system is installed, this soil is well suited to a variety of vegetables. If outlets are available, simple water control systems function well to remove excess water in wet seasons and to provide subsurface irrigation in dry seasons. Drainage is not feasible in most isolated small areas that have no natural outlet. In some areas, dikes are needed to keep out water from adjacent wet areas. In addition to drainage and irrigation, fertilizer and lime should be applied according to crop needs.

This soil is poorly suited to citrus. If drainage and water control are adequate, this soil is well suited to high quality pasture of improved grass and clover. Adequate application of fertilizer and lime according to plant needs and control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-7.

Arents

ASF—Arents, very steep. This is a sloping to very steep, excessively drained, sandy soil that formed in dominantly sandy material excavated from canals and deposited along the banks. This soil is in the long, narrow ridges mostly along the Hillsborough, Boynton, and West Palm Beach canals. The water table is below a depth of 60 inches.

No one pedon represents this mapping unit, but the surface layer of one of the more common ones is grayish brown sand about 5 inches thick. The layer below that is light brownish gray sand about 23 inches thick. It has many shell fragments. Below that there is a layer of very dark gray sand about 8 inches thick. This layer has some shell fragments and common, dark reddish brown, weakly cemented fragments. Layers of pale brown sand mixed with shell and limestone fragments are at a depth below 36 inches.

Permeability is rapid in all layers. The available water capacity, the organic-matter content, and natural fertility are very low. This soil is highly erodible, especially on steeper slopes. Areas are discontinuous and are on either side of a canal; they are not used as levees. Most areas have been shaped to reduce erosion, but few areas are vegetated.

Reference pedon of Arents, very steep, about 1 mile west of the Seaboard Coast Line Railroad on the north bank of the Hillsborough Canal.

A—0 to 5 inches; grayish brown (10YR 5/2) sand; single grained; loose; estimated 10 percent shell fragments; few small limestone fragments; few fine roots; mildly alkaline; clear wavy boundary.

C1—5 to 28 inches; light brownish gray (10YR 6/2) sand; single grained; loose; estimated 40 percent shell fragments; few small and medium limestone fragments; moderately alkaline; clear wavy boundary.

C2—28 to 36 inches; very dark gray (10YR 3/1) sand; weak fine granular structure; very friable; common dark reddish brown (5YR 2/2) fragments of a weakly cemented Bh horizon; estimated less than 10 percent shell fragments; moderately alkaline; gradual wavy boundary.

C3—36 to 50 inches; pale brown (10YR 6/3) sand; single grained; loose; few shell and limestone fragments; moderately alkaline; gradual wavy boundary.

C4—50 to 80 inches; mixture of pale brown (10YR 6/3) sand; white shell and limestone fragments; single grained; loose; moderately alkaline.

Texture is dominantly sand or fine sand to a depth of 80 inches. Pockets or lenses of gray to brown loamy sand, sandy loam, or sandy clay loam are in areas where this soil traverses soils that have a Bt horizon. Pockets or lenses of black muck or fragments from spodic horizons are in areas where this soil traverses organic soils or soils that have a Bh horizon. Shell fragments vary from place to place, but most areas in the eastern part of the survey area are underlain by shell material. Soil color is predominantly light, but dark layers or pockets of sand from the natural surface horizon are common. In places, layers of brownish yellow, iron-stained sand are discontinuous and have no common sequence or thickness. The spoil material is 10 to 30 feet high. It is slightly acid to moderately alkaline.

This soil is not suited to most plants. The sandy material is dry and infertile. Spanish needle, natalgrass, and a few other native grasses produce a sparse cover in most areas. Though cattle graze some areas, this soil has no important farming use. Not placed in a capability unit.

AU—Arents-Urban land complex. This complex consists of nearly level, somewhat poorly drained, sandy soils and Urban land. The soils formed in thick layers of sandy fill material that were placed over low, wet mineral soils to make the areas suitable for urban use. This complex is in the eastern part of the survey area and takes in golf courses, subdivisions, condominium developments, roadways, business or industrial areas, reclaimed borrow pits, and other areas filled over but not yet developed.

No one pedon represents this mapping unit, but the surface layer of one of the more common ones is dark gray and dark grayish brown sand, mixed with other shades of gray and brown, about 4 inches thick. Below this there is a layer of mottled brown sand about 20 inches thick. It has common weakly cemented fragments of strong brown, black, or dark reddish brown sand. Between depths of 24 and 60 inches are layers of light gray and dark gray sand that have a few thin lenses and mottles in shades of gray and brown.

This complex is about 60 to 75 percent Arents and 25 to 40 percent Urban land. Arents consist of lawns, vacant lots, golf courses, undeveloped areas, and other open land. Urban land consists of areas covered by streets, sidewalks, parking lots, buildings, and other structures. The percentage of Arents and Urban land varies.

Included with this complex in mapping are areas of better drained soils, soils that have a higher content of shells in some layers, and a few soils that have limestone at a depth of less than 50 inches. Also included are small areas of soils, near the Intracoastal Waterway and Lake Worth, that have a layer of marl or organic material below a depth of 20 inches.

The soil material is generally rapidly permeable in all layers. The available water capacity is low or very low. The organic-matter content and natural fertility are low in most places.

Reference pedon of Arents, in an area of Arents-Urban land complex, about 900 feet north of State Road 710 and 45 feet west of Australian Avenue in the Riviera Beach Industrial Park, SE1/4NW1/4 sec. 32, T. 42 S., R. 43 E.

A—0 to 4 inches; dark gray (10YR 4/1) and dark grayish brown (10YR 4/2) sand; common coarse pockets of very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), light brownish gray (10YR 6/2), and light gray (10YR 7/1); weak fine granular structure; very friable; many fine roots; slightly acid; clear wavy boundary.

C1—4 to 24 inches; brown (7.5YR 5/4) sand; few fine distinct yellowish red (5YR 4/6) mottles; weak fine granular structure; very friable; common pockets of strong brown (7.5YR 5/6); few black (N 2/0) and dark reddish brown (5YR 3/2) firm fragments ¼ to 1 inch in diameter from a Bh horizon; many fine and medium roots; medium acid; clear wavy boundary.

C2—24 to 30 inches; light gray (10YR 7/2) sand; single grained; loose; coarse mottles of grayish brown (10YR 5/2) and few pockets of strong brown (7.5YR 5/6) sand; common fine and medium roots; medium acid; clear wavy boundary.

C3—30 to 37 inches; dark gray (10YR 4/1) sand; weak fine granular structure; very friable; many uncoated sand grains; few fine and coarse roots; strongly acid; clear wavy boundary.

C4—37 to 60 inches; light gray (N 7/0) sand; single grained; loose; common dark gray (10YR 4/1) and very dark gray (10YR 3/1) vertical streaks in old root channels; medium acid.

Texture is dominantly sand or fine sand. There are pockets or thin layers of loamy sand, loamy fine sand, or sandy loam in places. A Bh horizon in fill areas is below a depth of 40 inches. A Bt horizon in fill areas is usually at a depth of more than 50 inches. Many pedons have fragments of a Bh horizon. Some pedons have less than 5 percent shell fragments in some or all layers. Soil color is highly variable, but it is dominantly shades of gray. Highly contrasting colors can occur in any layer. Most pedons do not have rock fragments, but some do. Some pedons have layers of calcareous materials. Reaction ranges from strongly acid to moderately alkaline.

Present land use generally precludes use of this complex for farming. Not placed in a capability unit.

AX—Arents-Urban land complex, organic substratum. This complex consists of nearly level, somewhat poorly drained, sandy soils and Urban land overlying organic soils. The areas were formerly organic marshes and swamps that were filled for urban use. This complex is primarily in the vicinity of Lake Mangonia and Clear Lake in the Palm Springs area, but it is also in a few places along the Intracoastal Waterway.

No one pedon represents this mapping unit, but one of the more common ones has variable layers of light gray, white, pale brown, and light yellowish brown sand in the upper 29 inches. Below that there is a 10-inch discontinuous layer of very pale brown and pale brown sand that has thin lenses of light gray and white sand, pockets of black sand, and fragments of dark colored, weakly cemented sand. Between depths of 39 and 72 inches are stratified layers of black and dark reddish brown muck. Gray sand extends to a depth of 80 inches.

This complex is about 50 to 75 percent Arents and 25 to 50 percent Urban land. Arents consist of lawns, vacant lots, undeveloped areas, and other open land. Urban land consists of areas covered by streets, sidewalks, driveways, houses, and other structures. The percentage of Arents and Urban land varies.

Included with this complex in mapping are areas of soils that do not have an organic substratum and small areas of soils along the Intracoastal Waterway that have a layer of soft marl between the sandy surface layer and the organic substratum. In a few small areas the organic material begins at a depth of 50 inches.

Permeability is rapid. The available water capacity is low or very low in the sand layers and very high in the organic layers. The organic-matter content and natural fertility are low. The underlying organic material has a low bearing strength, and onsite investigation of the depth and thickness of this layer should be made prior to any construction.

Reference pedon of Arents, organic substratum, about 0.7 mile west of Australian Avenue and 0.25 mile north of North Shore High School, SW1/4SW1/4 sec. 5, T. 43 S., R. 43 E.

1—0 to 29 inches; variable layers of light gray (10YR 7/2), white (10YR 8/2), pale brown (10YR 6/3), and light yellowish brown (10YR 6/4) sand; single grained; loose; irregular and discontinuous layers 1 to 8 inches thick; few firm black (10YR 2/1), dark brown (10YR 3/3), and dark reddish brown (5YR 3/2) iron concretions ½ to 1½ inches thick; few fine and medium roots; neutral; abrupt wavy boundary.

2—29 to 39 inches; very pale brown (10YR 7/3) and pale brown (10YR 6/3) stratified discontinuous layers of sand with black splotches; few thin lenses of light gray (10YR 7/2) and white (10YR 8/2); single grained; loose; few to common dark colored iron concretions; medium acid; abrupt wavy boundary.

Oa—39 to 72 inches; black (5YR 2/1) and dark reddish brown (5YR 2/2) muck in thin stratified layers; black lenses estimated 35 percent fiber unrubbed, less than 10 percent rubbed; lenses 1 to 4 inches thick; strongly acid; clear wavy boundary.

IIC—72 to 80 inches; gray (10YR 5/1) sand; single grained; loose; neutral.

Texture of the mineral layers is sand or fine sand. The surface layer is sandy and usually light colored, but color and stratification vary widely because of material reworking. Much of this material was dredged from adjacent water areas. Thickness of the mineral material over organic material ranges from 24 to 40 inches. Reaction ranges from strongly acid to neutral. Some pedons have shell fragments, and most pedons have fragments of a Bh horizon that are ¼ to 2 inches in diameter.

The Oa horizon is usually sapric, but in some pedons it contains hemic lenses or pockets. It is black (N 2/0; 10YR 2/1; 5YR 2/1), dark reddish brown (5YR 2/2, 3/2, 3/3), dark brown (7.5YR 3/2), or very dark brown (10YR 2/2). It is 10 to 36 inches thick and is strongly acid to neutral.

The IIC horizon is sand or fine sand. In some places it has shell fragments. It is very dark gray (10YR 3/1; N 3/0), dark gray (10YR 4/1; N 4/0), gray (10YR 5/1; N 5/0), or light gray (10YR 6/1, 7/1, 7/2; N 6/0, 7/0) and is medium acid to neutral.

Most areas of this complex have been developed for urban use. Not placed in a capability unit.

Basinger Series

The Basinger series consists of nearly level, poorly drained, sandy soils in broad, low sloughs and depressions in the eastern part of the survey area. These soils formed in thick beds of sandy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 2 to 6 months in most years and within 10 to 30 inches for the rest of the year. Depressions are covered with water for 3 to 9 months or more each year.

In a representative pedon the surface layer is gray fine sand about 4 inches thick. The subsurface layer in

the upper 21 inches is white fine sand, and in the lower 4 inches it is dark grayish brown fine sand. The subsoil is dark reddish brown fine sand about 7 inches thick. The substratum extends to a depth of 72 inches or more and is pale brown fine sand.

Permeability is very rapid in all layers. The available water capacity is very low or low. The organic-matter content is very low, and natural fertility is low.

Representative pedon of Basinger fine sand, about 300 feet east of Australian Avenue and 0.3 mile north of Belvedere Road, NE1/4SE1/4 sec. 29, T. 43 S., R. 43 E.

Ap—0 to 4 inches; gray (10YR 6/1) fine sand; weak fine granular structure; very friable; many fine roots; very strongly acid; clear wavy boundary.

A2—4 to 25 inches; white (10YR 8/1) fine sand; common very dark gray (10YR 3/1) streaks and few fine black mottles in root channels, mostly in upper part; single grained; loose; few fine and medium roots; very strongly acid; clear smooth boundary.

A3—25 to 29 inches; dark grayish brown (10YR 4/2) fine sand; many fine faint light gray mottles; single grained; loose; many uncoated sand grains; few black streaks in old root channels; very strongly acid; clear wavy boundary.

Bh—29 to 36 inches; dark reddish brown (5YR 3/4) fine sand; weak fine granular structure; very friable; few fine and medium grayish brown (10YR 5/2), light gray (10YR 6/1), and black (10YR 2/1) streaks; few medium dark reddish brown (5YR 2/2) weakly cemented fragments; many uncoated sand grains; very strongly acid; gradual wavy boundary.

C—36 to 72 inches; pale brown (10YR 6/3) fine sand; single grained; loose; common black streaks with thin yellowish red outer rings in old root channels; very strongly acid.

Reaction throughout the pedon ranges from very strongly acid to mildly alkaline. The A horizon is 14 to 40 inches thick. The A1 horizon is black (N 2/0; 10YR 2/1), very dark gray (10YR 3/1), dark gray (10YR 4/1), gray (10YR 5/1, 6/1), or light gray (10YR 7/1). The A2 horizon is gray (10YR 5/1, 6/1), light gray (10YR 7/1, 7/2), light brownish gray (10YR 6/2), or white (10YR 8/1, 8/2). This horizon in places has mottles in shades of brown and yellow. The A3 horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), brown (10YR 5/3), pale brown (10YR 6/3), or pinkish gray (7.5YR 6/2). It has many uncoated sand grains. The A3 horizon is 4 to 20 inches thick. Some pedons do not have an A3 horizon.

The Bh horizon is dark brown (10YR 3/3, 4/3; 7.5YR 4/4), brown (10YR 5/3), pale brown (10YR 6/3), or dark reddish brown (5YR 3/4). It has few to common weakly cemented, small to medium Bh horizon fragments of black (10YR 2/1; 5YR 2/1), very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), dark brown (7.5YR 3/2), or dark reddish brown (5YR 2/2, 3/3, 3/4). This horizon has common to many uncoated grains, and in places it has few to common mottles. It is 6 to 20 inches thick.

The C horizon is brown (10YR 4/3, 5/3), pale brown (10YR 6/3), grayish brown (10YR 5/2), light brownish gray (10YR 6/2; 2.5Y 6/2), gray (10YR 6/1), or light gray (10YR 7/1, 7/2).

Basinger soils are associated with Immokalee, Myakka, Pomello, Pompano, Anclote, Placid, and Sanibel soils. Unlike the Myakka, Immokalee, and Pomello soils, they lack a Bh horizon that is weakly cemented and well coated with organic matter. They have a poorly developed Bh horizon, which Pompano soils lack. Basinger soils lack the thick, dark colored A horizon that Anclote and Placid soils have. They have a mineral surface layer, and Sanibel soils have an organic surface layer.

Ba—Basinger fine sand. This is a nearly level, poorly drained, deep, sandy soil in broad grassy sloughs in the eastern part of the county. This soil has the pedon described as representative of the series. The water table is within 10 inches of the surface for 2 to 6 months in most years and within 10 to 30 inches for the rest of the year.

Included with this soil in mapping are small areas of Myakka, Immokalee, Pompano, Anclote, and Placid soils. Also included are some areas where the soil has a thin layer of organic material on the surface and a few places where a loamy substratum is deep in the soil.

The natural vegetation is St. Johnswort; slash pine, southern bayberry, and scattered cypress; pineland three-awn, blue maidencane, broomsedge bluestem, and low panicum grasses. Most areas of this soil are in native vegetation or improved pasture. A few areas are used for vegetables. Some large areas that were once cropped have been idle for years.

Unless drained, this soil is not suited to cultivated crops. If drained and intensively managed, it is moderately well suited to vegetables. Providing a well-designed, constructed, and maintained water control system that maintains the level of the water table and provides subsurface irrigation is a major concern of management. Frequent applications of fertilizer and lime are needed.

This soil is poorly suited to citrus. Because it is in low-lying positions and normally has a high water table, water control is difficult. A well-designed water control system and bedding are needed if citrus is planted, and frequent applications of fertilizer are needed. Maintaining fertility is difficult because the soil is sandy and low in natural fertility. During dry periods, irrigation is needed to insure good yields.

If intensively managed, this soil is well suited to improved pasture of grass or grass and clover. Providing a water control system that is less intensive but is otherwise similar to that required for cultivated crops, applying fertilizer and lime as needed, and carefully controlling grazing are major management concerns. Capability unit IVw-1.

Bc—Basinger-Urban land complex. This complex consists of Basinger fine sand and Urban land. About 50 to 70 percent of this complex is open land, such as lawns and vacant lots. These areas are made up of nearly level, poorly drained Basinger soils that have been modified in most places by spreading about 15 inches of fill material on the original surface. The original soil below the fill material is Basinger fine sand. About 20 to 40 percent of the acreage is covered by sidewalks, streets, driveways, buildings, and other structures.

The rest of the complex is Pompano, Myakka, and Immokalee soils, which have about 15 inches of fill material on the surface, and Basinger, Placid, and Anclote soils in depressions, which have up to 20 inches of fill material spread on the surface.

The percentage of urban areas and open land varies. Where drainage has been improved, the water table is at a greater depth than in undrained areas, except for brief periods after heavy rains.

Present land use precludes the use of this complex for farming. Not placed in a capability unit.

BM—Basinger and Myakka sands, depressional. These are nearly level, very poorly drained, sandy soils in shallow depressions. The depressions are small to large isolated ponds or poorly defined narrow drainageways that have many branches. Generally, Basinger soils make up about 45 percent of this complex. Both soils can occur separately or together. The water table is above the surface for 3 to 9 months or more in most years.

Included with these soils in mapping are small areas of Pompano, Placid, Anclote, and Sanibel soils.

The natural vegetation is St. Johnswort; cypress and melaleuca trees; maidencane, needlegrass, sand cordgrass, and other water-tolerant grasses and sedges. Most areas of these soils are in native vegetation. These soils are not suited to cultivated crops or improved pasture. Capability unit VIIw-1.

Beaches

Bn—Beaches consist of narrow strips of tide-washed sand along the Atlantic coast line. They range from less than 100 feet to more than 500 feet in width, but most are less than 200 feet wide. As much as half of the beach may be covered by water during daily high tides, and all of the beach may be covered during storm periods. The shape and slope of the beaches may change with every storm. Most beaches have a uniform, gentle slope up to the edge of the water. Others have wave-built ridges that have short, stronger slopes, ranging to 8 percent or more. There are a few shallow inland swales. Most areas have no vegetation, but the inland edge may be sparsely covered with moonvine, railroad vine, sea oats, and seashore bermudagrass. Depth to the water table is highly variable, depending on the distance from the water, the height of the beach, the effect of storms, or the time of year. The depth to the water table ranges from 0 to 6 feet or more, depending on time and place.

Beaches are frequently mixed and reworked by waves. They are firm or compact near the edge of the water, but the drier sands further back are loose. Beaches consist of pale brown to light gray sand grains of uncoated quartz and are mixed with multicolored, sand-sized to ½-inch shell fragments. Few to many coarser shell fragments occur in all parts of the soil. Some areas have pockets or lenses of coquina shell; other areas consist of large shell fragments and little or no sand. Rock outcrops are scattered throughout. Some are at the edge of the water and act as a barrier to each incoming wave, for example, at the north survey area line and at the Singer Island area. Others are submerged and exposed only at low tides, for example, at Lake Worth and Boca Raton beaches.

Beaches are not suited to crops or pasture. They are suited mainly to recreation use and wildlife habitat and have great esthetic value. Capability unit VIIIw-1.

Boca Series

The Boca series consists of nearly level, poorly drained soils in low broad flats and poorly defined drainageways. These soils formed in moderately thick beds of sandy and loamy marine sediments that rest on limestone. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months and is in the limestone during the driest periods.

In a representative pedon the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is fine sand. In the upper 7 inches it is light brownish gray and in the lower 17 inches it is light gray. The subsoil is dark grayish brown sandy clay loam about 5 inches thick. It has gray and brown mottles. At a depth of about 34 inches a 2-inch layer of soft marl rests directly on limestone that contains numerous solution holes.

Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. The available water capacity is low or very low in the surface and subsurface layers and medium in the subsoil. The organic-matter content and natural fertility are low.

Representative pedon of Boca fine sand, about 0.1 mile north of Hillsboro Canal and 2.25 miles west of U.S. Highway 441, NE1/4SW1/4 sec. 27, T. 47 S., R. 41 E.

Ap—0 to 5 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many uncoated sand grains; many fine roots; strongly acid; abrupt wavy boundary.

A21—5 to 12 inches; light brownish gray (10YR 6/2) fine sand; few fine faint pale brown mottles; single grained; loose; many fine and medium roots; strongly acid; gradual wavy boundary.

A22—12 to 29 inches; light gray (10YR 7/2) fine sand; few dark brown (10YR 4/3) streaks in old root channels; single grained; loose; medium acid; abrupt irregular boundary.

Btg—29 to 34 inches; dark grayish brown (10YR 4/2) sandy clay loam; many fine and medium distinct very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) mottles; weak medium subangular blocky structure; slightly sticky, plastic; few fine roots; sand grains coated and bridged with clay; moderately alkaline; abrupt irregular boundary.

IIC—34 to 36 inches; light gray (10YR 7/2) soft marl intricately intermixed; medium and coarse pockets of very dark grayish brown (10YR 3/2) sandy loam; common very dark gray streaks in old root channels; few fine roots; moderately alkaline, calcareous; abrupt irregular boundary.

IIIR—36 inches; fractured hard limestone containing solution holes.

Thickness of the solum and depth to limestone range from 24 to 40 inches, but solution holes in the limestone extend to a depth of 50 inches or more. Depth to the Btg horizon ranges from 20 to 40 inches, and more than 40 inches in solution holes that occur within each square meter. The Btg horizon is cyclic and rests directly on the limestone.

The A horizon is 20 to 36 inches thick and is strongly acid to neutral. The Ap or A1 horizon is black (10YR 2/1; N 2/0), very dark gray (N 3/0; 10YR 3/1), very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), dark grayish brown (10YR 4/2), or gray (10YR 5/1). Thickness ranges from 3 to 9 inches. A1 or Ap horizons that are black (N 2/0; 10YR 2/1), very dark gray (N 3/0; 10YR 2/1) or very dark grayish brown (10YR 3/2) are less than 6 inches thick. The A2 horizon is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), brown (10YR 5/3), light gray (10YR 7/1, 7/2), light brownish gray (10YR 6/2), pale brown (10YR 6/3), or very pale brown (10YR 7/3).

Some pedons have a B1 horizon, which is brown (10YR 5/3), dark brown (10YR 4/3), yellowish brown (10YR 5/4, 5/6), or pale brown (10YR 6/3) fine sand with at least 3 percent increase in clay content. It is 0 to 3 inches thick.

The B2tg horizon is grayish brown (10YR 5/2; 2.5Y 5/2),

light brownish gray (10YR 6/2; 2.5Y 6/2), gray (10YR 5/1, 6/1; 2.5Y 5/1), or dark grayish brown (10YR 4/2) with common to many mottles of gray, yellow, or brown. This horizon is sandy loam or sandy clay loam and has pockets of loamy sand or sand. It ranges from 4 to 20 inches thick and is neutral to moderately alkaline.

The IIC horizon is 1 to 3 inches thick. It is made up of mixed fragments of rock, marl, sandy loam, or sandy clay loam. Some pedons have no IIC horizon. The IIIR horizon is fractured limestone containing solution holes.

Boca soils are associated with Riviera, Pineda, Jupiter, Pinellas, and Hallandale soils. Unlike these soils, Boca soils have limestone at a depth of 24 to 40 inches, except in solution holes. They lack the Bir horizon that Pineda soils have, the A2ca horizon that Pinellas soils have, and the thick A1 horizon that Jupiter soils have.

Bo—Boca fine sand. This is a nearly level, poorly drained soil that has a loamy subsoil that is underlain by fractured limestone at a depth of 24 to 40 inches. This soil is on broad, low flats and in poorly defined drainageways between the Everglades and coastal ridge. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months and is in the limestone during the driest periods.

Included with this soil in mapping are small areas of similar soils. Some of these soils have a loamy subsoil above the limestone and others have a brownish to yellowish sandy layer above the loamy subsoil. Also included are small areas of Hallandale, Riviera, Pineda, and Pinellas soils.

The natural vegetation is slash pine, cabbage palm, saw-palmetto, southern bayberry, inkberry, and a wide variety of native grasses. Most areas of this soil are in natural vegetation or improved pasture. A few areas are being used for cultivated crops and some areas are being developed for urban use.

Unless drained, this soil is not suited to cultivated crops. The root zone is limited by a high water table and by limestone that is above a depth of 40 inches. If drained and well managed, this soil is well suited to some crops. The water control system should provide rapid removal of excess water during rainy periods. Because of the moderate depth to limestone, effective water control is difficult. Regular application of fertilizer is needed.

This soil is moderately suited to citrus if intensive water control is used. Because of the moderate depth to limestone however, adequate water control is difficult. Regular application of fertilizer is needed for good yields.

If intensively managed, this soil is well suited to improved pasture grass. Providing a water control system similar to, but less intensive than that required for frequent applications of fertilizer, and careful control of grazing are major management concerns. Capability unit IIIw-2.

Canaveral Series

The Canaveral series consists of nearly level, somewhat poorly drained to moderately well drained, sandy soils in low dunelike areas near the coast. These soils formed in thick beds of marine sand and shell fragments. Under natural conditions, the water table is within 10 to 40 inches of the surface for 2 to 6 months or more in most years, and may recede to a depth of 50 inches or more during dry periods.

In a representative pedon the surface layer is dark grayish brown sand mixed with shell fragments. It is about 8 inches thick. Below this is pale brown and very pale brown mixed sand and shell fragments that extend to a depth of 65 inches or more.

Permeability is very rapid. The available water capacity is very low. The organic-matter content and natural fertility are very low.

Representative pedon of Canaveral sand, about 0.75 mile north of Royal Poinciana Way on North County Road, SE1/4NE1/4 sec. 15, T. 43 S., R. 43 E.

A—0 to 8 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; estimated 15 percent sand-size and a few coarse shell fragments; moderately alkaline, calcareous; clear wavy boundary.

C1—8 to 24 inches; pale brown (10YR 6/3) sand; single grained; loose; estimated 25 to 40 percent multicolored sand-size shell fragments; moderately alkaline, calcareous; diffuse wavy boundary.

C2—24 to 65 inches; very pale brown (10YR 7/3) sand; single grained; loose; estimated 40 to 60 percent sand-size shell fragments; few small nearly white fragments weakly cemented with lime; moderately alkaline, calcareous.

Reaction is neutral to moderately alkaline in all horizons. Shell fragments are calcareous. Texture is dominantly sand but ranges to coarse sand to a depth of 65 inches or more.

The A horizon is very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), or dark grayish brown (10YR 4/2). It is 4 to 9 inches thick and has a shell content that ranges from 5 to 15 percent.

The C horizon is pale brown (10YR 6/3), very pale brown (10YR 7/3), light gray (10YR 7/1, 7/2), gray (10YR 6/1), or grayish brown (10YR 5/2) and in places has mottles in shades of brown and yellow. Shell content ranges from 10 to 60 percent. Shell content commonly increases with depth, and in some pedons sand and shell fragments are stratified.

Canaveral soils are associated with Cocoa and Palm Beach soils and soils in tidal swamps. Unlike Cocoa soils, they lack a Bt horizon that rests on limestone. They are more poorly drained than either Cocoa or Palm Beach soils. Canaveral soils are not subject to tidal flooding as are soils in tidal swamps.

Cc—Canaveral-Urban land complex. This complex consists of Canaveral sand and Urban land. About 25 to 40 percent of this complex is covered by sidewalks, streets, parking areas, buildings, and other structures. About 40 to 60 percent of the complex consists of lawns, vacant lots, and undeveloped areas. These open areas are made up of nearly level, somewhat poorly drained to moderately well drained Canaveral soils that have been modified in places by spreading about 12 inches of mixed shell and sand fill material over the original surface layer. The original soil below the fill material is Canaveral sand and has a pedon similar to that described as representative of the series.

The rest of the complex consists of similar soils that have a thin organic subsoil or a thin subsoil of dark gray silty clay loam. Included are similar soils that have a brown subsoil, and soils that are more poorly drained.

About 80 percent of the fill material is a mixture of sand, limestone and shell fragments that range from sand size to about 3 inches in diameter. The remaining 20 percent is sand.

The depth to the water table depends mainly on the established drainage in the area. The water table is

generally below a depth of 30 inches as a result of artificial drainage.

The percentage of open land and urban areas varies. Present and future land use precludes the use of this complex for farming. Not placed in a capability unit.

Chobee Series

The Chobee series consists of nearly level, very poorly drained, loamy soils in depressions in low, nearly level areas between the Everglades and the coastal ridge. These soils formed in beds of loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for more than 6 months in most years. Soils in depressions are covered by water most of each year.

In a representative pedon the surface layer is black fine sandy loam about 16 inches thick. The subsurface layer is dark gray fine sandy loam about 10 inches thick. The subsoil in the upper 6 inches is gray sandy clay loam, and in the lower 5 inches it is grayish brown sandy clay loam. The underlying material is a mixture of light gray loamy sand and shell fragments.

Permeability is moderately rapid in the surface layer, moderate in the subsoil, and rapid in the underlying material. The available water capacity is medium in the surface layer and medium to high in the subsoil. Organic-matter content is high, and natural fertility is medium.

Representative pedon of Chobee fine sandy loam, about 4.0 miles north of State Road 80 and about 0.5 mile east of Royal Palm Beach Blvd., SW1/4SE1/4 sec. 11, T. 43 S., R. 41 E.

A11—0 to 4 inches; black (N 2/0) fine sandy loam; moderate medium granular structure; very friable; many uncoated sand grains; many fine roots; estimated 15 percent organic-matter content; extremely acid; clear wavy boundary.

A12—4 to 16 inches; black (N 2/0) fine sandy loam; common fine and medium distinct very dark grayish brown (10YR 3/2) mottles; weak coarse subangular blocky structure; friable; many fine roots; many uncoated sand grains; few gray vertical sand streaks in old crayfish burrows; few to common thin vertical streaks of black sticky clay; strongly acid; gradual wavy boundary.

A3—16 to 26 inches; dark gray (10YR 4/1) fine sandy loam; few fine faint brown mottles; weak coarse subangular blocky structure; slightly sticky, slightly plastic; sand grains thinly coated and bridged with clay; many fine roots; medium acid; clear wavy boundary.

B21tg—26 to 32 inches; gray (N 5/0) sandy clay loam; weak coarse subangular blocky structure; slightly sticky, slightly plastic; common fine and medium roots; few to common fine shell fragments and small whole shells; moderately alkaline, calcareous; clear wavy boundary.

B22tg—32 to 37 inches; grayish brown (10YR 5/2) sandy clay loam with shell fragments; weak fine subangular blocky structure; slightly sticky, slightly plastic; common fine roots; few medium size, firm to friable yellowish brown iron concretions; estimated 10 percent shell fragments; common small to large limestone fragments; moderately alkaline, calcareous; gradual wavy boundary.

IIC—37 to 40 inches; light gray (10YR 7/2) loamy sand and shell fragments; few small to large shells and shell fragments; moderately alkaline, calcareous.

The A horizon is a few inches thicker and more acid than the defined range for the series, but this difference does not alter its use and behavior. The A horizon is 20 to 40 inches thick. It ranges from extremely acid to neutral; the upper few inches is the most acid. The A1 horizon is black (10YR 2/1; N 2/0) or very dark gray (10YR 3/1; N 3/0), and is 10 to 24 inches thick. The A3 horizon is dark gray (10YR 4/1; N 4/0) or gray (10YR 5/1; N 5/0), and in places it has mottles. Some pedons do not have an A3 horizon.

The B2tg horizon is black (N 2/0; 10YR 2/1) to light brownish gray (10YR 6/2) and in places it has mottles. It is sandy clay loam or sandy loam. In some places it is sandy loam that has numerous pockets of sand or loamy sand. Some pedons have a B3g horizon, which is dark gray (10YR 4/1), gray (10YR 5/1, 6/1), or grayish brown (10YR 5/2), and in places it has mottles. It is sandy loam, loamy sand, or loamy fine sand and is mildly alkaline.

The IIC horizon is a mixture of loamy sand material and shell fragments. In some places a sandy C horizon is over layers of shell fragments.

Chobee soils are associated with Tequesta, Floridana, Riviera, and Winder soils. Unlike Tequesta soils, they lack an Oa horizon. They have a thicker, dark colored A1 horizon than Riviera soils. They have a finer textured A horizon than Floridana soils. Chobee soils have a thicker, darker A1 horizon than Winder soils and lack tongues of surface material that extend into the Btg horizon.

Ch—Chobee fine sandy loam. This is a nearly level, very poorly drained soil that has a surface layer of dark colored fine sandy loam and a subsoil of sandy clay loam. This soil is in depressions and low, nearly level areas between the Everglades and the coastal ridge. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for more than 6 months in most years. Depressions are covered by water most of each year.

Included with this soil in mapping are small areas of Riviera, Winder, Floridana, and Tequesta soils. Also included are soils that have a dark surface layer slightly less than 10 inches thick and other soils that have coarser textures in all layers.

The natural vegetation is pickerelweed, needlegrass, sawgrass, maidencane, ferns, sedges, and scattered areas of cypress, sweetbay, sweetgum, and southern bayberry. Most areas of this soil are in natural vegetation or improved pasture.

If a water control system is installed, this soil is well suited to a variety of vegetables. Such a system should maintain the level of the water table and provide for subsurface irrigation in dry periods. Drainage is generally not feasible in small isolated areas that do not have a natural outlet. In some areas dikes are needed to keep out water from adjacent wet areas. Fertilizer and lime should be applied according to crop needs.

This soil is poorly suited to citrus. If drainage and water control are adequate, it is well suited to high quality pasture of grasses and clover. Applications of fertilizer and lime according to plant needs and control of grazing are needed. Capability unit IIIw-6.

Cocoa Series

The Cocoa series consists of nearly level to sloping, well drained, sandy soils on narrow ridges near the Atlantic coast. They formed in moderately thick sandy marine sediments over porous, coquina limestone.

In a representative pedon the surface layer in the upper 3 inches is very dark grayish brown sand and in the lower 5 inches it is dark brown sand. The next layer is loose yellowish red sand about 14 inches thick. The subsoil is very friable, yellowish red sand about 8 inches thick. Hard, coquina limestone is below the subsoil at a depth of 30 inches.

Permeability is rapid in all layers above the limestone. The available water capacity is very low in the upper sandy layers and low in the subsoil. The organic-matter content and natural fertility are low.

Representative pedon of Cocoa sand, in an area of Cocoa-Urban land complex, about 0.1 mile west of Highway A1A and 100 feet north of State Road 806A, northeastern Delray beach on the island, NW1/4SE1/4 sec. 9, T. 46 S., R. 43 E.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) sand; weak fine granular structure; very friable; many uncoated sand grains; few to common fine black organic matter nodules; many fine and medium roots; neutral; clear wavy boundary.

A12—3 to 8 inches; dark brown (7.5YR 3/2) sand; weak fine granular structure; very friable; many fine and medium roots; mixture of dark gray, brown, and uncoated sand grains; few fine black organic-matter granules; slightly acid; gradual wavy boundary.

B1—8 to 22 inches; yellowish red (5YR 4/6) sand; single grained; loose; few fine roots; most sand grains thinly coated with iron oxides; slightly acid; abrupt irregular boundary.

B2t—22 to 30 inches; yellowish red (5YR 5/8) sand; weak fine granular structure; very friable; slightly sticky; few fine roots; sand grains well coated with iron oxides; slight increase in clay content from horizon above; clay bridging between sand grains; neutral; abrupt wavy boundary.

IIR—30 inches; hard, pale brown to white coquina limestone containing numerous solution holes.

Depth to coquina limestone ranges from 20 to 40 inches within short distances. Reaction ranges from medium acid to mildly alkaline in all horizons above the limestone. Slopes generally range from 0 to 5 percent, and a few short slopes range to 8 percent.

The A1 horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or dark brown (10YR 3/3; 7.5YR 3/2). This horizon is 4 to 8 inches thick. Some pedons have an A2 horizon which is strong brown (7.5YR 5/8), or yellowish brown (10YR 5/6, 5/8), and ranges to 12 inches in thickness.

The B1 horizon is strong brown (7.5YR 5/8), or yellowish red (5YR 4/6, 5/6), and is 10 to 16 inches thick. Sand grains in the A2 and B1 horizons are coated with iron oxides.

The B2t horizon is strong brown (7.5YR 5/6, 5/8), yellowish red (5YR 4/6, 5/8), or red (2.5YR 4/6,, 4/8), and is 6 to 16 inches thick. Texture of the B2t horizon is sand, loamy sand, or loamy fine sand that has more than 3 percent increase in clay content over the above horizon. Sand grains are coated and bridged with clay. The limestone consists primarily of cemented coquina shell and shell fragments mixed with sand.

Cocoa soils are associated with Palm Beach and Canaveral soils. They have a weakly expressed B2t horizon that overlies coquina limestone, and Canaveral and Palm Beach soils do not. Cocoa soils are better drained than Canaveral soils.

CuB—Cocoa-Urban land complex. This complex consists of Cocoa sand that has 0 to 8 percent slopes and Urban land. About 40 to 65 percent of this complex is open land, such as lawns, vacant lots, and playgrounds. These areas are made up of nearly level to sloping, well drained Cocoa soils that have been modified in many places by grading to create level building sites. In a few places road beds have been cut several feet into the coquina limestone that underlies the soil. About 25 to 40 percent of the complex is covered by sidewalks, streets, parking areas, buildings, and other structures.

The rest of the complex consists of similar soils that have a depth of less than 20 inches or more than 40 inches to limestone and small areas of Canaveral sand. The similar soils have in many places been modified by cutting or grading, and many of the Canaveral soil areas have been modified by spreading fill material on the original surface.

The percentage of open land and urban areas varies. Present land use precludes the use of this complex for farming. Not placed in a capability unit.

Dania Series

The Dania series consists of nearly level, very poorly drained, shallow, organic soils in broad marshes on the fringes of the Everglades. These soils formed in thin deposits of hydrophytic plant remains overlying limestone. Under natural conditions, the water table is within 10 inches of the surface for 6 to 12 months, except during extended dry seasons. During wet seasons these soils are covered by water.

In a representative pedon the surface layer is black well-decomposed muck about 4 inches thick. The next layer is dark reddish brown muck about 12 inches thick. Below this is a very thin layer of light gray sand that rests on hard limestone at a depth of about 18 inches.

Permeability is rapid in all layers. The available water capacity is very high in the muck layers and very low or low in the thin sandy layer above the limestone. The natural fertility is moderate.

Representative pedon of Dania muck about 200 feet south of State Road 827 and 0.5 mile east of Conservation Area 2A, NW1/4SE1/4, sec. 19, T. 47 S., R. 41 E.

Oa1—0 to 4 inches; black (5YR 2/1) well-decomposed muck (sapric material); less than 10 percent fiber; moderate fine and medium granular structure; friable; many fine and medium roots; estimated mineral content less than 5 percent; slightly acid; clear wavy boundary.

Oa2—4 to 16 inches; dark reddish brown (5YR 3/3) sapric material; estimated 30 percent fiber, 10 percent rubbed; massive; friable, many fine and medium roots; estimated mineral content less than 5 percent; few black streaks along old root channels; few small sand pockets in lower part; slightly acid; abrupt smooth boundary.

IIC—16 to 18 inches; gray (10YR 6/1) sand; single grained; loose; common fine roots; thin root mat at contact with rock; moderately alkaline; abrupt wavy boundary.

IIIR—18 inches; hard continuous limestone that has solution holes 2 to 11 inches in depth and 4 to 15 in width.

Thickness of the solum and depth to limestone range from 8 to 20 inches. Reaction ranges from medium acid to neutral in the Oa horizon and from neutral to moderately alkaline in the IIC horizon.

The Oa horizon is black (5YR 2/1, N 2/0) or dark reddish brown (5YR 2/2, 3/2), and is 8 to 18 inches thick. Fiber content in this horizon ranges to about 33 percent, but after rubbing it is less than 16 percent. Mineral content ranges from 5 to 20 percent and is highest near the boundary with the underlying IIC horizon.

The IIC horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), grayish brown (10YR

5/2), light brownish gray (10YR 6/2), gray (10YR 6/1), or light gray (10YR 7/2), and in places has mottles. It is sand, fine sand, or loamy sand and thickness ranges from 0 to 44 inches.

Dania soils are associated with Lauderhill, Pahokee, Jupiter, Hallandale, and Boca soils. Unlike Lauderhill and Pahokee soils, they have limestone at a depth of less than 20 inches. They are of organic origin, and Jupiter, Hallandale, and Boca soils are of mineral origin.

Da—Dania muck. This is a nearly level, very poorly drained, shallow, organic soil that rests on limestone. This soil is in broad marsh areas on the fringes of the Everglades. It formed in thin deposits of hydrophytic plant remains. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 6 to 12 months in most years, except during extended dry seasons. Water covers the surface in wet seasons.

Included with this soil in mapping are small areas of Lauderhill, Pahokee. Jupiter, Hallandale, and Boca soils. In some areas the organic material is peaty muck.

The natural vegetation is sawgrass, willow, elderberry, and a few native grasses. Most areas of this soil are cleared and used for improved pasture or sod.

This soil is not suited to cultivated crops or citrus because of wetness and shallowness to limestone. In its native state this soil is too wet for most improved pasture grasses, but with a simple drainage system that removes excess surface water after rains, it is suitable for several improved pasture grasses. Capability unit Vw-1.

Floridana Series

The Floridana series consists of nearly level, very poorly drained soils that have a thick, black sandy surface layer and a loamy subsoil. These soils are on broad, low flats and in depressions and formed in thick beds of sandy and loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 6 months or more during most years. Depressions are covered by water most of each year.

In a representative pedon the surface layer is black fine sand about 18 inches thick. The subsurface layer is gray fine sand about 14 inches thick. The subsoil is grayish brown fine sandy loam between a depth of 32 and 44 inches. Below this is light brownish gray fine sand that has a few pockets of grayish brown sandy loam. This layer extends to a depth of 65 inches or more.

Permeability is rapid in the surface and subsurface layers, moderate in the subsoil, and rapid below this. The available water capacity is medium in the surface layer, low in the subsurface layer, and medium in the subsoil. Organic-matter content is high in the surface layer, and natural fertility is low.

Representative pedon of Floridana fine sand, about 1.0 mile north of State Road 80, and about 100 feet east of Seminole Road, NE1/4SW1/4 sec. 25, T. 43 S., R. 40 E.

A1—0 to 18 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine, medium, and coarse roots; estimated 15 percent organic-matter content; sand grains well coated with organic matter, many uncoated sand grains; common small pockets of light gray fine sand; slightly acid; clear wavy boundary.

A2—18 to 32 inches; gray (10YR 6/1) fine sand; few fine faint grayish brown (10YR 5/2) mottles and few very dark gray (10YR 3/1) and dark brown (10YR 4/3) streaks along old root channels; single grained; loose; few fine roots; slightly acid; clear wavy boundary.

Btg—32 to 44 inches; grayish brown (2.5Y 5/2) fine sandy loam; common medium faint dark grayish brown (2.5Y 4/2) mottles; massive in place, breaks to weak coarse subangular structure; slightly sticky, slightly plastic; few small pockets of light gray fine sand; few fine faint dark brown streaks in old root channels; neutral; gradual wavy boundary.

C—44 to 65 inches; light brownish gray (10YR 6/2) fine sand; few medium faint grayish brown (2.5Y 5/2) mottles and few very dark gray (10YR 3/1) streaks or pockets; single grained; nonsticky; few small pockets of grayish brown sandy loam; moderately alkaline.

Reaction ranges from slightly acid to neutral. The A horizon is 20 to 40 inches thick. The A1 horizon is black (N 2/0; 10YR 2/1) or very dark gray (N 3/0; 10YR 3/1). It is 10 to 22 inches thick. The A2 horizon is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), or light gray (10YR 7/1, 7/2). In some pedons there is a thin discontinuous horizon at the base of the A horizon that is very dark grayish brown (10YR 3/2), very dark gray (10YR 3/1), or dark grayish brown (10YR 4/2) sand and is 1 to 2 inches thick.

The Btg horizon is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2; 2.5Y 6/2) and has mottles in shades of gray, brown, and yellow. Most pedons have pockets of sand or loamy sand. The Btg horizon is sandy loam or sandy clay loam, and it ranges from slightly acid to moderately alkaline. Some pedons have a grayish brown (10YR 5/2; 2.5Y 5/2) loamy sand or sandy loam B3 horizon below the Btg horizon. The C horizon is brown to gray fine sand, sand or loamy sand, or a mixture of sand and shell fragments.

Floridana soils are associated with Riviera, Tequesta, Pineda, Boca, and Holopaw soils. They have a thicker, dark colored A1 horizon than that of Riviera, Pineda, Boca, and Holopaw soils. They lack the tonguing of the A horizon into the Bt horizon that characterizes the Riviera soils. Floridana soils lack a Bir horizon, which Pineda soils have, and unlike Boca soils they do not have limestone within 40 inches of the surface. Floridana soils have a shallower Btg horizon than Holopaw soils. They are similar to Tequesta soils but lack a muck, or organic, surface layer.

Fa—Floridana fine said. This is a nearly level, very poorly drained soil that has a thick, black sandy surface layer and a loamy subsoil. This soil is on broad, low flats and in depressions. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 6 months or more during most years. Depressions are covered by water most of the year.

Included with this soil in mapping are small areas of Anclote, Riviera, Holopaw, and Tequesta soils. In some places limestone is directly below the loamy subsoil. Also included are soils that have a dark surface layer more than 24 inches thick, soils that have a darker colored subsoil, and soils that have a subsoil at a depth of slightly less than 20 inches or slightly more than 40 inches.

The natural vegetation is cypress, willow, bay, southern bayberry, St. Johnswort, maidencane, ferns, scattered sawgrass, pickerelweed, sedges, and water-tolerant grasses. Most of this land is in native vegetation or improved pasture.

In its natural condition this soil is not suited to cultivation. If drained and intensively managed, it is well suited to a variety of vegetables. A water control system that maintains the level of the water table and provides for subsurface irrigation in dry periods is a concern of management. Drainage is generally not feasible in small isolated areas that do not have a natural outlet. In some areas dikes are needed to keep out water from adjacent wet areas. Fertilizer and lime should be applied according to crop needs.

This soil is poorly suited to citrus. If drainage and water control are adequate, it is well suited to high quality pasture of grass and clover. Applications of fertilizer and lime according to plant needs and control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-8.

Hallandale Series

The Hallandale series consists of nearly level, poorly drained, shallow, sandy soils that rest on limestone. These soils are in low, broad flats between the Everglades and the coastal ridge. They formed in thin beds of sandy marine sediment over large limestone boulders. Under natural conditions, the water table is within 10 inches of the surface for 4 to 6 months during most years and at a depth of 10 to 30 inches the rest of the time, except during extremely dry periods. Water may cover the surface for 1 to 2 months.

In a representative pedon the surface layer is dark gray sand about 6 inches thick. The underlying material is very pale brown sand that rests on hard, fractured limestone boulders at a depth of about 15 inches. The depth to the limestone is greater than 20 inches in solution holes and in fractures between boulders.

Permeability is rapid in all layers. The available water capacity is medium in the surface layer and low in the underlying material. Organic-matter content and natural fertility are low.

Representative pedon of Hallandale sand, about 1.3 miles west of U.S. Highway 441 and about 0.1 mile north of Hillsboro Canal, SW1/4SE1/4 sec. 26, T. 47 S., R. 41 E.

Ap—0 to 6 inches; dark gray (10YR 4/1) sand; few medium faint dark grayish brown (10YR 4/2) mottles; weak fine granular structure; very friable; many uncoated sand grains; many fine and medium, few coarse roots; strongly acid; abrupt wavy boundary.

C—6 to 15 inches; very pale brown (10YR 7/3) sand; common medium distinct light yellowish brown (10YR 6/4) and few fine distinct yellowish brown (10YR 5/8) mottles; single grained; loose; few fine and medium roots; medium acid; abrupt wavy boundary.

R—15 inches; hard fractured limestone boulders.

This soil is commonly 7 to 20 inches thick, but fractures between limestone boulders and solution holes 50 inches or more deep contain a thin discontinuous Bt horizon.

The A horizon ranges from strongly acid to slightly acid. The Ap horizon is black (N 2/0; 10YR 2/1), very dark gray (N 3/0; 10YR 3/1), dark gray (N 4/0; 10YR 4/1), or gray (N 5/0, 6/0; 10YR 5/1, 6/1). It is 2 to 7 inches thick. Some pedons have an A2 horizon, which is dark gray (N 4/0; 10YR 4/1), gray (10YR 5/1, 6/1; N 5/0, 6/0), light gray (N 7/0; 10YR 7/1), grayish brown (10YR 5/2), or light brownish gray (10YR 6/2). It ranges to 8 inches thick.

In most areas the C horizon is between the A horizon and limestone. It is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), light gray (10YR 7/1, 7/2), brown (10YR 5/3), pale brown (10YR 6/3), or very pale brown (10YR 7/3, 7/4). It is medium acid to mildly alkaline.

Limestone beneath this soil is not continuous but appears to be a highly fractured remnant of once continuous bedrock. It consists mostly of large flat boulders with fractures between boulders ranging from less than 1 inch to 3 or 4 or more inches in width. Solution holes in and between the boulders range from about 4 inches to 3 feet in diameter and are at 1- to 6-foot intervals. A Bt horizon of light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4, 5/6), dark yellowish brown (10YR 4/4), or brown (10YR 5/3) thin discontinuous sandy loam, fine sandy loam, or sandy clay loam is in the solution pits. This horizon is thicker and has a higher content of clay in the deeper solution pits.

Hallandale soils are associated with Boca, Riviera, Pineda, Pinellas, Dania, and Jupiter soils. Unlike Boca, Riviera, Pineda, and Pinellas soils, they have limestone at a depth of less than 20 inches. Hallandale soils lack the Oa surface horizon of Dania soils and the thick, dark A1 horizon of Jupiter soils.

Ha—Hallandale sand. This is a nearly level, poorly drained, sandy soil that rests on limestone at a depth of 7 to 20 inches within short distances. This soil is on broad, low flats between the Everglades and the coastal ridge. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 4 to 6 months during most years and within 10 to 30 inches the rest of the time, except during extremely dry periods. Water may cover the surface for 1 to 2 months.

Included with this soil in mapping are small areas of Boca, Riviera, Pineda, Pinellas, and Jupiter soils. Also included are small areas of soils that have limestone at a depth of less than 7 inches or slightly more than 20 inches, and soils that have a yellowish brown or brownish yellow sandy layer above the limestone.

The natural vegetation is slash pine, saw-palmetto, cabbage palm, inkberry, scattered cypress, southern bayberry, pineland three-awn, and a wide variety of other grasses. Most areas of this soil are in native vegetation, but some areas are used for truck crops and improved pasture.

Unless drained, this soil is not suited to cultivated crops. The root zone is limited by a high water table and limestone that is close to the surface. If drained, this soil is suitable for a number of vegetables. A well designed and constructed water control system helps maintain the water table at an acceptable level and provides subsurface irrigation. Limestone near the surface, however, makes construction of such a system difficult. Frequent applications of fertilizer and lime are needed.

Unless very intensively managed, this soil is poorly suited to citrus, but if the water table is maintained below a depth of about 4 feet the soil is suitable for citrus. Trees should be planted on beds. Regular applications of fertilizer are needed.

If intensively managed, this soil is well suited to improved pasture of grass. Providing a water control system that is less intensive but is otherwise similar to the system required for cultivated crops, frequently applying fertilizer and lime as required, and carefully controlling grazing are major concerns of management. Capability unit IVw-4.

Holopaw Series

The Holopaw series consists of nearly level, poorly drained soils that have thick sandy surface and subsurface layers and a loamy subsoil. These soils are on broad, low-lying flats and in depressions throughout the eastern part of the survey area. They formed in thick beds of sandy and loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 2 to 6 months during most years. Depressions are covered by water for 6 months or more in most years.

In a representative pedon the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is about 38 inches thick. In the upper 10 inches it is light brownish gray fine sand; in the next 10 inches it is light gray fine sand that has a few yellow, brown, and gray mottles; and in the lower 18 inches it is gray fine sand. The subsoil is grayish brown sandy loam about 7 inches thick. Below this the substratum is grayish brown sand to a depth of 60 inches or more.

Permeability is rapid in the surface and subsurface layers and in the substratum and moderately rapid in the subsoil. The available water capacity is low to very low in the surface and subsurface layers and medium in the subsoil. Organic-matter content and natural fertility are low.

Representative pedon of Holopaw fine sand, about 1.0 mile northeast of L–8 levee and canal and about 1.8 miles south of Corbett Wildlife Management Area boundary, SE1/4NE1/4 sec. 25, T. 42 S., R. 39 E.

A1—0 to 4 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine roots; medium acid; clear wavy boundary.

A21—4 to 14 inches; light brownish gray (10YR 6/2) fine sand; common coarse faint grayish brown (10YR 5/2) and light gray (10YR 7/2) mottles; single grained; loose; common fine roots; slightly acid; clear wavy boundary.

A22—14 to 24 inches; light gray (10YR 7/1) fine sand; few fine and medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6) mottles; single grained; loose; few light brownish gray and dark grayish brown streaks along old root channels; slightly acid; clear wavy boundary.

A23—24 to 42 inches; light gray (10YR 7/1) fine sand; single grained; loose; few brown and many grayish brown streaks along old root channels; slightly acid; abrupt wavy boundary.

Btg—42 to 49 inches; grayish brown (10YR 5/2) sandy loam; few fine distinct yellowish red and few fine faint brown mottles; weak medium granular structure; slightly sticky, slightly plastic; many old roots; sand grains coated and bridged with clay; few pockets of light gray (10YR 7/1) fine sand; slightly acid; gradual wavy boundry.

C—49 to 60 inches; grayish brown (10YR 5/2) sand; single grained; nonsticky; common dark brown streaks in old root channels; neutral.

The A horizon is 40 to 72 inches thick, but is generally 40 to 60 inches. It is strongly acid to neutral. The A1 horizon is black (10YR 2/1), very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), or dark grayish brown (10YR 4/2). It is 4 to 8 inches thick. The A2 horizon is grayish brown (10YR 5/2), light grayish brown (10YR 6/2), gray (10YR 6/1), or light gray (10YR 7/1, 7/2).

The Btg horizon is gray (10YR 5/1, 6/1; N 5/0, 6/0), light gray (10YR 7/1, 7/2), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2) and has mottles in shades of brown, red, yellow, and olive. It is sandy loam or sandy clay loam in texture, and in places there are pockets or lenses of sand or loamy sand. It is slightly acid to moderately alkaline. Some pedons have white marl in old root channels.

The C horizon is grayish brown (10YR 5/2), light brownish gray (10YR 6/2; 2.5Y 6/2) gray (N 5/0, 6/0; 10YR 5/1, 6/1), or light gray (N 7/0; 10YR 7/1, 7/2) fine sand, loamy fine sand, or a mixture of sand and shell fragments. It is neutral to moderately alkaline.

Holopaw soils are associated with Basinger, Boca, Oldsmar, Pineda, Pompano, Riviera, Tequesta, and Wabasso soils Unlike Basinger and Pompano soils, they have a loamy Btg horizon within a depth of 72 inches. Holopaw soils do not have limestone within a depth of 75 inches as do Boca soils. Holopaw soils lack the weakly cemented Bh horizon of Oldsmar and Wabasso soils, the Bir horizon of Pineda soils, and the thin organic surface Oa horizon of Tequesta soils. The Btg horizon in Holopaw soils is at a greater depth than that in Riviera soils.

Ho—Holopaw fine sand. This is a nearly level, poorly drained soil that has a thick sandy surface layer and a loamy subsoil at a depth of 40 to 72 inches. This soil is on broad, low-lying flats and in depressions throughout the eastern part of the survey area. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 2 to 6 months during most years. Depressions are covered by water for 6 months or more in most years.

Included with this soil in mapping are small areas of Pompano, Basinger, Oldsmar, Riviera, Boca, Pineda, and Wabasso soils. Small areas of similar soils that have a thin organic surface layer are included in areas near the organic soils of the Everglades. Also included are similar soils that have thin, brownstained layers and soils that have a subsurface layer of brown and yellow.

The natural vegetation is saw-palmetto, slash pine, cypress, cabbage palm, inkberry, southern bayberry, sand cordgrass, broomsedge bluestem, blue maidencane, pineland three-awn, and other grasses. Most areas of this soil are in native vegetation or improved pasture.

Unless drained, this soil is not suited to cultivated crops. If drained and intensively managed, it is moderately well suited to vegetables. A well designed and constructed water control system helps maintain the water table at an adequate level and provides subsurface irrigation. Frequent applications of fertilizer and lime as needed are concerns of management.

This soil is poorly suited to citrus. Because it is in low positions and generally has a high water table, water control is difficult. A well designed water control system and bedding are needed if citrus is planted. Maintaining fertility is difficult because the soil is sandy and low in fertility. Frequent applications of fertilizer are needed. During dry periods, irrigation is needed to insure good yields.

If intensively managed, this soil is well suited to improved pasture of grass or grass and clover. Major concerns of management are providing a water control system that is less intensive but is otherwise similar to the system required for cultivated crops, frequently applying fertilizer and lime as needed, and carefully controlling grazing. Capability unit IVw–2.

Immokalee Series

The Immokalee series consists of nearly level, poorly drained, sandy soils in broad, flatwood areas in the eastern part of the survey area. These soils formed in deep sandy marine sediment. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months during wet periods, within 10 to 40 inches for 8 months or more in most years, but is below 40 inches in dry periods.

In a representative pedon the surface layer is black fine sand in the upper 4 inches and dark gray fine sand in the lower 7 inches. The subsurface layer is about 26 inches thick. In the upper 7 inches it is gray fine sand, and in the lower 19 inches it is light gray fine sand. A layer of black and very dark gray fine sand is at a depth of 37 to 45 inches. Below this is black fine sand, weakly cemented with organic matter to a depth of about 58 inches. Next is loose dark reddish brown fine sand to a depth of 79 inches. Below this is loose brown fine sand.

Permeability is rapid to a depth of 37 inches, moderate or moderately rapid to about 79 inches, and rapid below that. The available water capacity is medium in the weakly cemented layer and low or very low in all other layers. Natural fertility is low.

Representative pedon of Immokalee fine sand, about 75 feet north of paved access road to airport and about 0.25 mile northeast of Boca Raton Airport office, NW1/4SW1/4 sec. 7, T. 47 S., R. 43 E.

A11—0 to 4 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine roots; many uncoated sand grains; clear wavy boundary.

A12—4 to 11 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; common fine and medium roots; many uncoated sand grains; many 1/8 inch black organic-matter pellets in lower part; medium acid; clear wavy boundary.

A21—11 to 18 inches; gray (10YR 5/1) fine sand; single grained; few fine roots; loose; few lenses and pockets of light gray (10YR 7/1); common very dark gray (10YR 3/1) streaks along root channels; medium acid; gradual wavy boundary.

A22—18 to 37 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine roots; few to common very dark gray (10YR 3/1) streaks along root channels; slightly acid; abrupt smooth boundary.

B1—37 to 45 inches; black (10YR 2/1) and very dark gray (10YR 3/1) fine sand; many fine mottles of light gray (10YR 7/1) give a dappled appearance; single grained; loose; many roots matted at base of horizon; very strongly acid; clear wavy boundary.

B21h—45 to 52 inches; black (10YR 2/1) fine sand; common dark reddish brown (2.5Y 2/4) mottles in lower few inches; massive, crushes easily to weak fine granular structure; weakly cemented, few fine roots; sand grains well coated with organic matter; extremely acid; clear wavy boundary.

B22h—52 to 58 inches; black (5YR 2/1) fine sand; massive, crushes easily to weak fine granular structure; weakly cemented; few fine roots; sand grains well coated with organic matter; extremely acid; gradual wavy boundary.

B23h—58 to 79 inches; dark reddish brown (5YR 3/4) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

C—79 to 80 inches; brown (10YR 5/3) fine sand; single grained; loose; very strongly acid.

The A horizon is more than 30 inches thick. It is very strongly acid to medium acid, but if the soil is limed or receives dust from limestone pits or marl roads, it ranges to neutral. The A11 horizon is black (N 2/0; 10YR 2/1), very dark gray (N 3/0; 10YR 3/1), or dark gray (N 4/0; 10YR 4/1) and is 2 to 8 inches thick. The A12 horizon is dark gray (N 4/0; 10YR 4/1), or gray (10YR 5/1) and is 0 to 8 inches thick. The A2 horizon is gray (N 5/0, 6/0; 10YR 5/1, 6/1), light gray (N 7/0; 10YR 7/1, 7/2), or white (10YR 8/1, 8/2).

The B1 horizon is black (10YR 2/1), very dark gray (10YR 3/1), or dark gray (10YR 4/1) and has many uncoated sand grains. It is 0 to 8 inches thick. The B21h and B22h horizons are black (N 2/0; 5YR 2/1; 10YR 2/1), dark brown (7.5YR 3/2), or dark reddish brown (5YR 2/2, 3/2, 3/3). They are weakly cemented sand grains well coated with organic matter. They are 8 to 26 inches thick. The B23h horizon is friable to loose, dark reddish brown (5YR 3/4), dark brown (7.5YR 4/4; 10YR 3/3, 4/3), or dark yellowish brown (10YR 3/4) coated fine sand. It is 0 to 24 inches thick. Reaction of the Bh horizon ranges from extremely acid to medium acid.

The C horizon is very pale brown (10YR 7/3, 7/4), brown (10YR 5/3), dark grayish brown (10YR 4/2), or light brownish gray (10YR 6/2). Reaction of the C horizon ranges from very strongly acid to medium acid.

Immokalee soils are associated with Myakka, Basinger, Pomello, Wabasso, Oldsmar, Pompano, and St. Lucie soils. Unlike Myakka soils, they have a Bh horizon at a depth of more than 30 inches. They have a well developed Bh horizon rather than the weakly developed Bh horizon of the Basinger soils. Immokalee soils are more poorly drained than Pomello soils. Unlike Wabasso soils, they have a Bh horizon below 30 inches. They lack the loamy B'tg horizon of Wabasso and Oldsmar soils. They have a Bh horizon that Pompano and St. Lucie soils do not have, and they are more poorly drained than St. Lucie soils.

Im—Immokalee fine sand. This is a nearly level, poorly drained, deep, sandy soil that has a dark colored layer below a depth of 30 inches that is weakly cemented with organic matter. This soil is in broad flatwood areas in the eastern part of the survey area. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months during wet periods, within 10 to 40 inches for 8 months or more in most years, but it is below 40 inches in dry periods.

Included with this soil in mapping are small areas of Myakka, Basinger, Wabasso, and Oldsmar soils.

The natural vegetation is slash pine, saw-palmetto, inkberry, fetterbush, pineland three-awn, and many other grasses. Most areas of this soil are in native vegetation, but there are some areas in improved grass pasture and cultivated crops.

This soil is moderately well suited to vegetables if irrigation water is available. Intensive management and a very careful control of the water table level are necessary. A drainage system and a subsurface irrigation system that provides rapid removal of excess water in rainy periods and a means of irrigation in dry periods should be carefully designed, installed, and maintained. Application of fertilizer and lime is needed.

This soil is poorly suited to citrus because of poor drainage, rapid leaching of plant nutrients, and droughtiness in dry periods. If the groves are well managed and there is a properly designed water control system, citrus trees can be grown successfully.

A drainage system that removes excess water during wet periods allows for a high-quality pasture of improved grasses. Large applications of fertilizer and lime are required. If irrigated, clover can be grown with grasses. Capability unit IVw-3.

Jupiter Series

The Jupiter series consists of nearly level, poorly drained, shallow, sandy soils that rest on fractured limestone boulders containing solution holes (fig. 2). These soils are on broad, low flats, low hammocks, and in poorly defined drainageways east of the Everglades. They formed in a thin bed of sandy marine sediment that was deposited over limestone. Under natural conditions, the water table is within 10 inches of the surface for periods of 4 to 6 months during most years. These soils are covered by shallow water 2 to 4 months each year.

In a representative pedon the surface layer is black fine sand about 11 inches thick. Below this is a thin layer of light gray fine sand that has many streaks and mottles of black in old root channels. Large flat limestone boulders containing solution holes are at a depth of about 14 inches.

Permeability is rapid in all layers. The available water capability is medium to high in the surface layer and low or very low below that. Natural fertility is medium.

Representative pedon of Jupiter fine sand, about 3.5 miles west of U.S. Highway 441 and about 1,500 feet south of State Road 827, NW1/4SE1/4 sec. 28, T. 47 S., R. 41 E.

Ap—0 to 9 inches; black (N 2/0) fine sand; weak fine granular structure; very friable; many clean sand grains; many fine and medium roots; neutral; clear wavy boundary.

A12—9 to 11 inches; black (N 2/0) fine sand; many fine and medium distinct dark grayish brown (10YR 4/2) mottles and streaks, few pockets of light brownish gray (10YR 6/2) about 1 inch in diameter; single grained; loose; few fine and medium roots; neutral; clear wavy boundary.

C—11 to 14 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine roots; few fine distinct black (10YR 2/1) mottles or streaks in thin root mat at contact with rock; mildly alkaline; abrupt irregular boundary.

R—14 inches; hard limestone boulders containing solution holes.

Figure 2.—**Solution holes are common in Jupiter fine sand. This shallow sandy soil overlies hard limestone.**

Depth to fractured limestone boulders commonly ranges from 10 to 20 inches, but in places where the A horizon rests directly on the limestone, depth may be as shallow as 8 inches. Reaction throughout the soil ranges from slightly acid to moderately alkaline.

The A horizon is black (N 2/0; 10YR 2/1), very dark gray (N 2/0; 10YR 3/1), or very dark grayish brown (10YR 3/2) and in places has dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or light brownish gray (10YR 6/2) mottles in the lower few inches. The A horizon is generally 10 to 14 inches thick, but may be as shallow as 8 inches in places where it rests directly on limestone.

Some pedons have no C horizon as described. The C horizon can be as thick as 6 inches. It is grayish brown (10YR 5/2), gray (10YR 5/1, 6/1), light brownish gray (10YR 6/2) or light gray (10YR 7/1, 7/2), and in places it has mottles.

The underlying limestone is large flat boulders containing solution holes and fractures between boulders. It appears to be the remnant of an original limestone bedrock. In most pedons fractures are several inches wide. Solution holes are about ½ to 2 feet in diameter and 2 to 8 feet apart. These holes are filled primarily with gray or brown sandy material that extends to a depth of more than 50 inches or to the base of the solution hole within this depth. Many solution holes and fractures between boulders are partly filled with white, soft marl in the upper part, and at the bottom of some solution holes there is a thin layer of sandy loam that has marl fragments or shells.

Jupiter soils are associated with Dania, Boca, Riviera, Tequesta, and Hallandale soils. They lack the Oa horizon of Dania and Tequesta soils. Unlike Boca, Riviera, and Tequesta soils, they have limestone at a depth of less than 20 inches. Jupiter soils have a thick A1 horizon, and Hallandale soils do not.

Ju—Jupiter fine sand. This is a nearly level, poorly drained, shallow, sandy soil that rests on fractured limestone boulders. This soil is on broad, low flats, low hammocks, and in poorly defined drainageways. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for periods of 4 to 6 months during most years. Shallow water covers the surface for 2 to 4 months each year.

Included with this soil in mapping are small areas of Dania, Tequesta, Boca, Hallandale, and Riviera soils; soils that have a dark surface layer slightly less than 10 inches thick; and soils that have limestone at a depth of slightly more than 20 inches. In some areas there is a thin layer of organic material on the surface.

The natural vegetation is cabbage palm, scattered cypress, maidencane, ferns, southern bayberry, and a wide variety of grasses. Some areas of this soil have been used for cultivated crops or sod. Most areas are in improved pasture, and few are in native vegetation.

Unless drained, this soil is not suited to cultivated crops. The root zone is limited by a high water table and limestone that is close to the surface. If drained and intensively managed, it can be made suitable for a number of vegetables. A well-designed and constructed water control system helps maintain the water table at an acceptable level and provides subsurface irriga-

tion. Limestone near the surface, however, makes constructing such a system difficult. Frequent application of fertilizer and lime is needed.

Unless very intensively managed, this soil is poorly suited to citrus; but if the water table is maintained below a depth of about 4 feet, the soil is suitable for citrus. Trees should be planted on beds. Regular application of fertilizer is needed.

If intensively managed, this soil is well suited to improved pasture of grass. Major management concerns are providing a water control system that is less intensive but otherwise similar to that required for cultivated crops, frequently applying fertilizer and lime as required, and carefully controlling grazing. Capability unit IVw–4.

Lauderhill Series

The Lauderhill series consists of nearly level, very poorly drained, organic soils in broad freshwater marshes. These soils formed in moderately thick deposits of hydrophytic plant remains overlying limestone. Under natural conditions, the soil is covered by water, or the water table is within 10 inches of the surface for 6 to 12 months, except during extended dry periods.

In a representative pedon the surface layer is black granular muck about 8 inches thick. Below this is a layer about 10 inches thick of black muck that is slightly more fibrous. The next layer is dark reddish brown fibrous muck that extends from a depth of 18 to 26 inches. Hard limestone containing numerous solution holes is a depth of about 26 inches.

Permeability is rapid in all layers. The available water capacity is very high, and natural fertility is moderate.

Representative pedon of Lauderhill muck, about 0.5 mile west of U.S. Highway 27 and about 900 feet south of the access road to the Talisman Sugar Company mill, NW1/4SW1/4 sec. 10, T. 46 S., R. 37 E.

Oa—0 to 8 inches; black (N 2/0) muck (sapric material); estimated less than 5 percent fiber; moderate medium and coarse granular structure; very friable; sodium pyrophosphate extract is brown (10YR 4/3); slightly acid; clear wavy boundary.

Oa2—8 to 18 inches; black (5YR 2/1) muck (sapric material); estimated less than 10 percent rubbed fiber; moderate coarse subangular blocky structure, crushes to medium and coarse granular structure; friable; sodium pyrophosphate extract is yellowish brown (10YR 5/4); common coarse distinct pockets and lenses of dark reddish brown (5YR 2/2) sapric material; slightly acid; clear smooth boundary.

Oa3—18 to 26 inches; dark reddish brown (5YR 2/2) muck (sapric material); estimated 50 percent fiber unrubbed, 10 percent rubbed; estimated 25 percent mineral material; massive; sodium pyrophosphate extract is yellowish brown (10YR 5/4); neutral; abrupt wavy boundary.

R—26 inches; hard limestone containing numerous solution holes.

Thickness of sapric material and depth to limestone ranges from 20 to 36 inches. Reaction ranges from medium acid to mildly alkaline in 0.01M CaC12. The Oa horizon is black (N 2/0; 10YR 2/1; 5YR 2/1), dark reddish brown (5YR 2/2, 3/2, 3/3), very dark brown (10YR 2/2), or dark brown (10YR 3/3; 7.5YR 3/2). Fiber content is usually 5 to 33 percent but ranges to about 65 percent; rubbing drops the fiber content to 2 to 16 percent. Estimated mineral content in the organic material in the Oap and Oa2 horizons is about 15 to 30 percent. Some pedons have no Oa3 horizon and have a IIC horizon between the organic material and the limestone. The IIC horizon is black (10YR 2/1), very dark gray (10YR 3/1), dark gray (10YR 4/1), or gray (10YR 5/1) sand, loamy sand, sandy loam with or without carbonatic material. It ranges to about 6 inches in thickness, except where it fills solution holes and extends downward in the limestone. Some pedons do not have a IIC horizon.

Lauderhill soils are associated with Pahokee, Dania, Terra Ceia, and Okeelanta soils. Unlike Pahokee soils, they have organic material less than 36 inches thick. They have limestone below a depth of 20 inches, and Dania soils have it above 20 inches. They rest on limestone rather than on mineral material, as do Okeelanta soils. Lauderhill soils are not organic to below a depth of 52 inches as are Terra Ceia soils.

La—Lauderhill muck. This is a nearly level, very poorly drained, organic soil that rests on limestone at a depth of 20 to 36 inches. This soil is in broad, fresh water marshes and formed in moderately thick deposits of well-decomposed remains of hydrophytic plants overlying limestone.

Included with this soil in mapping are small areas of Pahokee, Terra Ceia, Okeelanta, and Dania soils. Also included are similar soils that have more fibrous, less decomposed organic material; a few spots where the soils have a thick layer of sand between the organic material and the limestone; and areas that have a high content of fine textured mineral and carbonatic material in the lower few inches of the Oa3 horizon.

The natural vegetation is sawgrass, willow, elderberry, bay, scattered cypress trees, and undergrowth of ferns, pickerelweed, maidencane, and other water-tolerant plants. Large areas of this soil have been cleared and are used for sugarcane, truck crops, pasture, and sod.

This soil is not suited to cultivation in its native state. If good water control is maintained through a system of dikes, ditches, and pumps, however, this soil is well suited to a wide variety of vegetables and sugarcane. In addition to maintaining the water control system, saturating the soil when crops are not growing minimizes oxidation of the organic material. Fertilizer and lime should be applied as needed.

This soil is not suited to citrus. It has many properties unfavorable for citrus, and the drainage needed for this crop would cause rapid deterioration of the soil.

If intensively managed, this soil is well suited to high-quality pasture of improved grasses and clover mixtures. Major management concerns are providing a water control system to remove excess surface water and to maintain the level of the water table, applying fertilizer and lime as required, and carefully controlling grazing. Capability unit IIIw–12.

Myakka Series

The Myakka series consists of nearly level, poorly drained, sandy soils in broad, flatwoods areas in the eastern part of the survey area. They formed in deep sandy marine sediment. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months in most years. It is within a depth of 10 to 40

inches for 6 months or more in most years and recedes to below 40 inches during extended dry periods.

In a representative pedon the surface layer is black sand about 7 inches thick. The subsurface layer is gray sand and extends to a depth of about 26 inches. Black and dark reddish brown sand, weakly cemented with organic matter, is between a depth of 26 to 36 inches. Below this, friable dark reddish brown sand extends to a depth of 47 inches. Next is dark brown sand to a depth of 55 inches. Below this is pale brown sand that extends to a depth of 72 inches or more.

Permeability is rapid to a depth of 26 inches, moderate to moderately rapid to about 47 inches, and rapid below this depth. The available water capacity is medium in the dark colored, weakly cemented layer and very low in all other layers. The organic-matter content and natural fertility are low.

Representative pedon of Myakka sand, about 100 feet north of Tenth Avenue North, and about 0.25 mile east of Jog Road, NE1/4NE1/4 sec. 22, T. 44 S., R. 42 E.

A11—0 to 3 inches; black (N 2/0) crushed sand; mixture of black (10YR 2/1) organic matter and light gray (10YR 7/1) uncoated sand grains; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

A12—3 to 7 inches; black (10YR 2/1) crushed sand; dark gray (10YR 4/1) uncrushed with light gray (10YR 7/1) uncoated sand grains; weak fine granular structure; very friable; common fine and medium roots; very strongly acid; gradual wavy boundary.

A2—7 to 26 inches; gray (10YR 6/1) sand; single grained; few very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) streaks in old root channels; loose; few fine roots; strongly acid; abrupt wavy boundary.

B21h—26 to 31 inches; black (5YR 2/1) sand mixed with dark reddish brown (5YR 2/2) sand; massive, parts to moderate fine and medium granular structure; weakly cemented; few fine roots; few fine pockets of light gray sand; most sand grains well coated with organic matter, few thinly coated, few uncoated; strongly acid; clear wavy boundary.

B22h—31 to 36 inches; dark reddish brown (5YR 2/2) sand mixed with dark reddish brown (5YR 3/3) and black (5YR 2/1) sand; massive, parts to moderate fine and medium granular structure; weakly cemented; strongly acid; clear wavy boundary.

B23h—36 to 47 inches; dark reddish brown (5YR 3/4) sand; weak fine and medium granular structure; common dark reddish brown (5YR 3/3) and dark brown (7.5YR 3/2) streaks in old root channels; very friable; few black decomposed medium and coarse roots; medium acid; gradual wavy boundary.

B3—47 to 55 inches; dark brown (10YR 4/3) sand; common coarse distinct dark brown (7.5YR 3/2) mottles; single grained; loose; slightly acid; gradual wavy boundary.

C—55 to 72 inches; brown (10YR 5/3) sand; single grained; loose; slightly acid.

Reaction throughout ranges from very strongly acid to slightly acid. Crushed color of the A1 horizon is black (N 2/0; 10YR 2/1), very dark gray (N 3/0; 10YR 3/1), or dark gray (N 4/0; 10YR 4/1). This horizon is 4 to 8 inches thick. Uncrushed colors have a salt-and-pepper appearance. The A2 horizon is gray (10YR 5/1, 6/1), light gray (10YR 7/1), or white (10YR 8/1) and is 12 to 24 inches thick. Thickness of the A horizon ranges from 20 to 30 inches.

Some pedons have a transitional layer that is 1 to 2 inches thick. This layer is very dark gray (10YR 3/1) and has many uncoated light gray (10YR 7/1) sand grains and vertical streaks.

The Bh horizon is black (N 2/0; 10YR 2/1; 5YR 2/1), very dark brown (10YR 2/2), or dark reddish brown (5YR 2/2, 3/2, 3/3, 3/4). Sand grains are well coated and weakly cemented with organic matter. Thickness ranges from 8 to 24 inches. Many pedons have a B3 horizon that is 4 to 12 inches thick. Where present, this horizon is dark brown (10YR 3/3, 4/3; 7.5YR 4/4), or brown (10YR 5/3). The C horizon is brown (10YR 5/3) or very pale brown (10YR 7/3, 7/4).

Myakka soils are associated with Immokalee, Basinger, Pomello, Wabasso, and Oldsmar soils. Unlike Immokalee, Pomello, and Oldsmar soils, they have a Bh horizon within a depth of 30 inches. They are more poorly drained than Pomello soils. They lack the Bt horizon that is beneath the Bh horizon in Wabasso and Oldsmar soils. Myakka soils have a well developed, weakly cemented Bh horizon, and Basinger soils do not.

Mk—Myakka sand. This is a nearly level, poorly drained, deep, sandy soil that has a dark colored layer, weakly cemented with organic matter, above a depth of 30 inches. It is in broad, flatwoods areas in the eastern part of the survey area. This soil has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months in most years. It is within a depth of 10 to 40 inches for 6 months or more in most years and recedes to below 40 inches during extended dry periods.

Included with this soil in mapping are small areas of soils that have a thick, dark colored surface layer, and small areas of Immokalee, Pomello, Basinger, Wabasso, and Oldsmar soils.

The natural vegetation is slash pine, saw-palmetto, inkberry, fetterbush, pineland three-awn, and many other grasses. Most areas of this soil are in native vegetation, but some large areas are in improved pasture and cultivated crops.

If irrigation water is available this soil is moderately well suited to vegetables. Intensive management is necessary and a very careful control of the water table is essential. A drainage system or a subsurface irrigation system that removes excess water rapidly in rainy seasons and provides irrigation in dry seasons should be carefully designed, installed, and maintained. Fertilizer and lime should be applied as needed.

This soil is poorly suited to citrus. Poor drainage, rapid leaching of plant nutrients, and droughtiness adversely affect the growth of citrus. If the groves are well managed and there is a properly designed water control system, citrus trees can be grown successfully.

If a drainage system is established to remove excess water during wet seasons, a high quality pasture of improved grasses can be maintained on this soil. If irrigated, clover can be grown with grasses. Large applications of fertilizer and lime are required. Capability unit IVw-3.

Mu—Myakka-Urban land complex. This complex consists of Myakka sand and Urban land. About 25 to 50 percent of the complex is covered by streets, sidewalks, driveways, houses, and other structures. About 40 to 65 percent of the complex consists of open land, such as lawns, vacant lots, and playgrounds. These areas are made up mainly of nearly level, poorly drained Myakka sand, which has been modified in most places by spreading about 12 inches of sandy fill material on the original surface. Myakka sand has a pedon similar to that described as representative of the series.

Included in mapping are Immokalee, Basinger, and Pompano soils, all of which have sandy fill material over the original surface.

The percentage of urban area and open land varies. Most areas have been drained to some degree by a system of canals and ditches, and the water table generally is at a greater depth than is typical for Myakka soils. Following heavy rains, the water table may rise to within 10 inches of the surface for periods of up to 1 month.

Present land use precludes use for farming. Not placed in a capability unit.

Okeechobee Series

The Okeechobee series consists of nearly level, very poorly drained, organic soils in large fresh water marshes in the central part of the survey area. These soils formed in thick deposits of hydrophytic plant remains. Under natural conditions, the soil is covered by water, or the water table is within 10 inches of the surface at all times, except during extended dry periods.

In a representative pedon the surface layer is black granular muck (sapric material) about 8 inches thick. Below this is a layer of black muck about 20 inches thick that has faint bands of dark reddish brown muck. The next layer is dark reddish brown fibrous mucky peat (hemic material) about 22 inches thick. Below this is dark reddish brown muck that extends to a depth of 66 inches or more.

Permeability is rapid in all layers. The available water capacity is very high throughout. Natural fertility is moderate.

Representative pedon of Okeechobee muck, about 2.5 miles south of State Road 80 and about 0.1 mile west of Levee L–7, NW1/4SW1/4 sec. 13, T. 44 S., R. 39 E.

Oap—0 to 8 inches; black (10YR 2/1) muck (sapric material); less than 5 percent fiber rubbed; moderate fine and medium granular structure; friable; sodium pyrophosphate extract color is brown (10YR 5/3); estimated about 90 percent organic matter; medium acid; clear wavy boundary.

Oa2—8 to 28 inches; black (5YR 2/1) muck (sapric material); about 25 percent fiber, less than 10 percent rubbed; massive; sodium pyrophosphate extract color is pale brown (10YR 6/3); estimated about 90 percent organic matter, few thin bands of less decomposed dark reddish brown (5YR 2/2) muck; slightly acid; clear wavy boundary.

Oe—28 to 50 inches; dark reddish brown (5YR 3/3) mucky peat (hemic material); about 60 percent fiber, 25 percent rubbed; massive; sodium pyrophosphate extract color is light gray (10YR 7/2); pockets and streaks of dark reddish brown (5YR 2/2) and reddish brown (5YR 4/4); estimated about 90 percent organic matter; slightly acid; clear wavy boundary.

Oa3—50 to 66 inches; dark reddish brown (5YR 2/2) muck (sapric material); about 30 percent fiber, 10 percent rubbed; massive; estimated about 80 percent organic matter; many small black (5YR 2/1) granules; slightly acid.

The organic material is more than 51 inches thick. Reaction ranges from medium acid to moderately alkaline when measured with a field test kit. The pH is more than 4.5 when measured in 0.01M CaC12. Mineral content ranges from about 5 to 40 percent between a depth of 16 and 51 inches.

The Oa horizon is black (N 2/0; 10YR 2/1; 5YR 2/1), dark reddish brown (5YR 2/2, 3/2, 3/3), or very dark brown (10YR 2/2) muck (sapric material). Fiber content is commonly less than 33 percent but ranges to about 50 percent unrubbed and less than 16 percent rubbed. The Oe horizon is black (N 2/0; 10YR 2/1; 5YR 2/1), dark reddish brown (5YR 2/2, 3/2, 3/3, 3/4), very dark brown (10YR 2/2), or dark brown (7.5YR 3/2; 10YR 4/3). Fiber content ranges from 33 to 70 percent unrubbed and 16 to 40 percent rubbed. The Oe horizon commonly is beneath the Oa horizon at a depth of 24 to 40 inches. In some pedons it is interlayered with an Oa horizon at a depth of 20 to 51 inches, and the Oa horizon is dominant. Composite thickness is 10 inches or more. Fibers are typically those of nonwoody plants, but in some pedons fiber from woody plants ranges from about 5 to 30 percent. Some pedons lack the Oa3 horizon as described, and the Oe horizon extends to a depth of below 51 inches.

Okeechobee soils are associated with Okeelanta, Terra Ceia, and Pahokee soils. Unlike Okeelanta soils, they lack a mineral IIC horizon within a depth of 40 inches. They have an Oe horizon more than 10 inches thick within a depth of 51 inches, and Terra Ceia soils do not. Okeechobee soils lack the limestone that is within a depth of 51 inches in Pahokee soils.

Oc—Okeechobee muck. This is a nearly level, very poorly drained, deep, organic soil in large fresh water marshes in the central part of the survey area. It formed in the remains of hydrophytic plants. It has the pedon described as representative of the series. Under natural conditions, it is covered by water, or the water table is within 10 inches of the surface at all times, except during extended dry periods.

Included with this soil in mapping are small areas of Terra Ceia, Okeelanta, and Pahokee soils; and soils that have a slightly higher fiber content and are well-decomposed.

The natural vegetation is sawgrass, sedges, aquatic grasses, and scattered clumps of cypress, myrtle, and bay trees. Most areas are used for sugarcane. Some areas are used for cultivated crops, sod, or improved pasture. A few areas are in native vegetation.

This soil is not suited to cultivation in its native state. If good water control is established and maintained through a system of ditches, dikes, and pumps, it is well suited to a wide variety of vegetables and sugarcane. In addition to maintaining the water control system, saturating the soil when crops are not growing minimizes oxidation of the organic material. Fertilizer and lime should be applied according to crop needs.

This soil is not suited to citrus. It has many soil properties unfavorable to citrus, and the drainage needed for this crop would cause rapid deterioration of the soil.

If intensively managed, this soil is well suited to high-quality pasture of improved grasses and clover mixtures. Providing a water control system to remove excess surface water and to maintain the level of the water table, adequately applying fertilizer and lime as required, and carefully controlling grazing are major management concerns. Capability unit IIIw–13.

Okeelanta Series

The Okeelanta series consists of nearly level, very poorly drained, organic soils in large freshwater marshes and in small isolated depressions. These soils formed in moderately thick deposits of hydrophytic plant remains over sandy mineral material. Under na-

tural conditions, the soil is covered by water or the water table is within 10 inches of the surface 6 to 12 months in most years, except during extended dry periods.

In a representative pedon the surface layer is black muck (sapric material) about 8 inches thick. Below this is a layer of dark reddish brown muck that extends to a depth of 31 inches. Next is a thick layer of very dark gray fine sand that changes to light gray fine sand at a depth of about 55 inches.

Permeability is rapid in the organic and mineral layers. The available water capacity is very high in the organic layers and low in the underlying sandy layers. Natural fertility is moderate.

Representative pedon of Okeelanta muck, 2.75 miles east of U.S. Highway 441 and about 4.75 miles north of U.S. Highway 98, SW1/4SE1/4 sec. 19, T. 41 S., R. 38 E.

Oap—0 to 8 inches; black (N 2/0) muck (sapric material); less than 10 percent fiber; weak fine and medium granular structure; very friable; estimated mineral content 10 percent; mildly alkaline; clear smooth boundary.

Oa2—8 to 31 inches; dark reddish brown (5YR 2/2) muck (sapric material); about 35 percent fiber, 10 percent rubbed; massive; friable; estimated mineral content 10 percent; mildly alkaline; clear smooth boundary.

IIC1—31 to 55 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; mildly alkaline; clear wavy boundary.

IIC2—55 to 65 inches; light gray (10YR 7/2) fine sand; single grained; loose; many fine shell fragments; moderately alkaline, calcareous.

The Oa horizon is 16 to 40 inches thick. It is medium acid to moderately alkaline when measured with a field test kit. The pH is more than 4.5 if measured in 0.01M CaC12. The Oa horizon is black (N 2/0; 10YR 2/1; 5YR 2/1), dark reddish brown (5YR 2/2, 3/2, 3/3), very dark brown (10YR 2/2), or dark brown (10YR 3/3, 4/3; 7.5YR 3/2) sapric material (muck). Fiber content ranges from about 2 to 16 percent after rubbing. Mineral content ranges from about 10 to 30 percent.

The IIC horizon is black (10YR 2/1), very dark gray (10YR 3/1), dark gray (10YR 4/1), gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), or light gray (10YR 7/1, 7/2) sand, fine sand, or loamy sand that has few to many fine shell fragments. Many pedons have no shell fragments. Sandy mineral material extends to a depth below 51 inches.

Okeelanta soils are associated with Terra Ceia, Okeechobee, Pahokee, Sanibel, and Tequesta soils. Unlike Okeechobee and Terra Ceia soils, Okeelanta soils have a sandy IIC horizon within a depth of 40 inches. They have a sandy IIC horizon rather than limestone underlying the organic layer as in Pahokee soils. Okeelanta soils are of organic origin, and Sanibel and Tequesta soils are of mineral origin and have only a thin organic surface layer.

On—Okeelanta muck. This is a nearly level, very poorly drained, organic soil that has sandy mineral material within a depth of 40 inches. It is in large, fresh water marshes and small, isolated depressions. It has the pedon described as representative of the series. Under natural conditions, the soil is covered by water, or the water table is within 10 inches of the surface for 6 to 12 months in most years, except during extended dry periods.

Included with this soil in mapping are small areas of Pahokee, Lauderhill, Terra Ceia, Okeechobee, Sanibel, and Tequesta soils; and soils that have a slightly higher fiber content and are less well-decomposed.

The natural vegetation is sawgrass, ferns, fireflag, maidencane, pickerelweed, and scattered areas of willow, elderberry, southern bayberry, cypress, and custard apple. Large areas are in native vegetation. Other areas are used for sugarcane, sod, and improved pasture.

This soil is not suited to cultivation in its native state. If good water control is established and maintained through a system of dikes, ditches, and pumps, it is well suited to a wide variety of vegetables and sugarcane. In addition to maintaining the water control system, saturating the soil when crops are not growing minimizes oxidation of the organic material. Fertilizer and lime should be applied according to crop needs.

This soil is not suited to citrus. It has many soil properties unfavorable to citrus, and the drainage needed for this crop would cause rapid deterioration of the soil.

If intensively managed, this soil is well suited to high-quality pasture of improved grasses and clover mixtures. Major management concerns are providing a water control system to remove excess surface water and to maintain the level of the water table, adequately applying fertilizer and lime as required, and carefully controlling grazing. Capability unit IIIw–11.

Oldsmar Series

The Oldsmar series consists of nearly level, poorly drained, sandy soils that have a dark layer weakly cemented by organic matter over loamy material. These soils are on broad, flatwoods areas. They formed in thick beds of sandy and loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 1 to 3 months during most years. It is within 10 to 40 inches for 6 or more months in most years and recedes below 40 inches in extended dry periods.

In a representative pedon the surface layer is very dark gray sand about 8 inches thick. Next is a subsurface layer of sand that extends to a depth of about 34 inches. The first 5 inches is grayish brown, the next 13 inches is white, and the last 8 inches is grayish brown. The next layer is black sand weakly cemented by organic matter and is about 8 inches thick. Below this is a layer of dark grayish brown sandy loam about 4 inches thick. Below this is a layer of brown loamy sand that overlies layers of mixed sand, shell, and marl at a depth of about 50 inches.

Permeability is rapid in the sandy surface layer and in the subsurface layer, moderate or moderately rapid in the weakly cemented sand and sandy loam layer, and rapid below this. The available water capacity is very low to a depth of about 34 inches, medium to a depth of about 46 inches, and low below that. Organic-matter content and natural fertility are low.

Representative pedon of Oldsmar sand, 200 feet north of State Road 822 and about 300 feet west of the Sunshine State Parkway, SE1/4SE1/4 sec. 32, T. 44 S., R. 42 E.

A1—0 to 8 inches; very dark gray (10YR 3/1) sand; mixture of fine black (N 2/0) organic-matter granules and gray (10YR 6/1) sand grains; weak fine granular structure; very friable; many fine and

few medium roots; strongly acid; clear wavy boundary.

A21—8 to 13 inches; grayish brown (10YR 5/2) sand; many fine faint yellowish brown mottles; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.

A22—13 to 26 inches; white (10YR 8/1) sand; single grained; loose; strongly acid; gradual wavy boundary.

A23—26 to 34 inches; grayish brown (10YR 5/2) sand; many fine distinct dark grayish brown mottles; single grained; loose; many fine and medium roots; common black and very dark gray streaks in old root channels; strongly acid; clear wavy boundary.

Bh—34 to 42 inches; black (5YR 2/1) sand; common medium distinct dark reddish brown (5YR 2/2) mottles; massive in place, crushes to weak fine granular structure; weakly cemented; friable; many fine roots; sand grains well coated with organic matter; lower 2 inches dominantly dark reddish brown (5YR 2/2); strongly acid; abrupt wavy boundary.

B2t—42 to 46 inches; dark grayish brown (10YR 4/2) sandy loam; few medium faint very dark grayish brown (10YR 3/2) mottles; weak coarse subangular blocky structure; friable; many fine and medium old roots; sand grains coated and bridged with clay; few thin light brownish gray (10YR 6/2) sand streaks; slightly acid; clear wavy boundary.

B3—46 to 50 inches; brown (10YR 5/3) loamy sand; weak coarse subangular blocky structure; friable; common large pockets of sandy loam; slightly acid; abrupt wavy boundary.

IICca—50 to 54 inches; mixed yellowish brown and white sand and marl modules; partly cemented; mildly alkaline, calcareous.

Combined thickness of the A and Bh horizons ranges from 40 to 60 inches. The A horizon is more than 30 inches thick. It is strongly acid or very strongly acid. The A1 horizon is black (10YR 2/1; N 2/0), very dark gray (10YR 3/1; N 3/0), or dark gray (10YR 4/1; N 4/0) and is 4 to 8 inches thick. The A2 horizon is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), light gray (10YR 7/1, 7/2), light brownish gray (10YR 6/2), or white (10YR 8/1). In some pedons the A2 horizon has mottles of brown or yellow. Some pedons have a very dark gray (10YR 3/1; N 3/0), dark gray (10YR 4/1; N 4/0), dark grayish brown (10YR 4/2), or dark brown (10YR 4/3) transitional A&Bh horizon that ranges to 4 inches in thickness.

Reaction of the Bh horizon ranges from very strongly acid to slightly acid. It is black (10YR 2/1; 5YR 2/1), very dark brown (10YR 2/2), dark brown (7.5YR 3/2), or dark reddish brown (5YR 2/2, 3/2). Thickness ranges from 8 to 16 inches. Some pedons have a Bh&B3 horizon beneath the Bh horizon. The Bh&B3 horizon is dark brown (10YR 3/3; 7.5YR 4/4), dark yellowish brown (10YR 3/4, 4/4), or brown (10YR 4/3, 5/3) and has black or dark reddish brown weakly cemented fragments. The B2t horizon is dark grayish brown (10YR 4/2; 2.5Y 4/2), gray (10YR 5/1), or grayish brown (10YR 5/2; 2.5Y 5/2) sandy loam or sandy clay loam and has gray, brown, or yellow mottles. It is slightly acid to moderately alkaline.

The IICca horizon is sand or loamy sand, sand and shell fragments, or sand that has fragments of marl or limestone.

Oldsmar soils are associated with Immokalee, Wabasso, Holopaw, Riviera, and Tequesta soils. Unlike Immokalee soils, they have a sandy loam Bt horizon beneath the Bh horizon. In Oldsmar soils the Bh and Bt horizons are at greater depths than in Wabasso soils. Oldmar soils have a Bh horizon; Holopaw, Riviera, and Tequesta soils do not. Oldsmar soils lack the muck Oa surface horizon of Tequesta soils.

Os—Oldsmar sand. This is a nearly level, poorly drained, sandy soil that has a dark colored, weakly cemented layer below a depth of 30 inches over a loamy layer. It is in broad, flatwood areas. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 1 to 3 months during most years. It is within 10 to 40 inches for 6 or more months in most years and recedes to below 40 inches in extended dry periods.

Included with this soil in mapping are small areas of Immokalee, Myakka, Wabasso, Basinger, Holopaw, Riviera, and Tequesta soils; and soils that have a subsurface layer of brown and yellow.

The natural vegetation is saw-palmetto, slash pine, cabbage palm, inkberry, southern bayberry, pineland three-awn, blue maidencane, fetterbush, broomsedge, bluestem, and a variety of other grasses. Some areas are in cultivated crops and improved pasture. Most of this soil is in native vegetation.

If irrigation water is available, this soil is moderately well suited to vegetables. Intensive management and a very careful control of the water table level are essential. A drainage system or a subsurface irrigation system that rapidly removes excess water in rainy periods and irrigates in dry periods should be carefully designed, installed, and maintained. Application of fertilizer and lime is needed.

This soil is poorly suited to citrus. Poor drainage, rapid leaching of plant nutrients, and droughtiness affect the growth of citrus. If the groves are well managed and there is a properly designed water control system, citrus trees can be grown successfully.

If a drainage system is established to remove excess water during wet periods, a high-quality pasture of improved grasses can be maintained on this soil. Large applications of fertilizer and lime are required. If irrigated, clover can be grown with grasses. Capability unit IVw-3.

Pahokee Series

The Pahokee series consists of nearly level, very poorly drained, organic soils in broad, freshwater marshes. These soils formed in moderately thick deposits of hydrophytic plant remains over limestone. Under natural conditions, the soil is covered by water, or the water table is within 10 inches of the surface for 6 to 12 months during most years, except during extended dry periods.

In a representative pedon the upper 28 inches is black muck (sapric material). Below this is dark reddish brown muck that extends to the limestone bedrock at a depth of 42 inches. The limestone has numerous solution holes (fig. 3).

Permeability is rapid. The available water capacity is very high, and natural fertility is moderate.

Representative pedon of Pahokee muck, 0.5 mile west of State Road 827-A and about 200 feet north of State Road 827, NW1/4SE1/4 sec. 30, T. 44 S., R. 37 E.

Oap—0 to 10 inches; black (N 2/0) muck (sapric material); less than 5 percent fiber unrubbed; moderate coarse subangular blocky structure, parting to moderate fine and medium granular structure; very friable; sodium pyrophosphate extract is dark brown (10YR 4/3); estimated mineral content 35 percent; slightly acid; clear smooth boundary.

Oa2—10 to 28 inches; black (5YR 2/1) muck (sapric material); about 65 percent fiber, 10 percent rubbed; massive; sodium pyrophosphate extract is pale

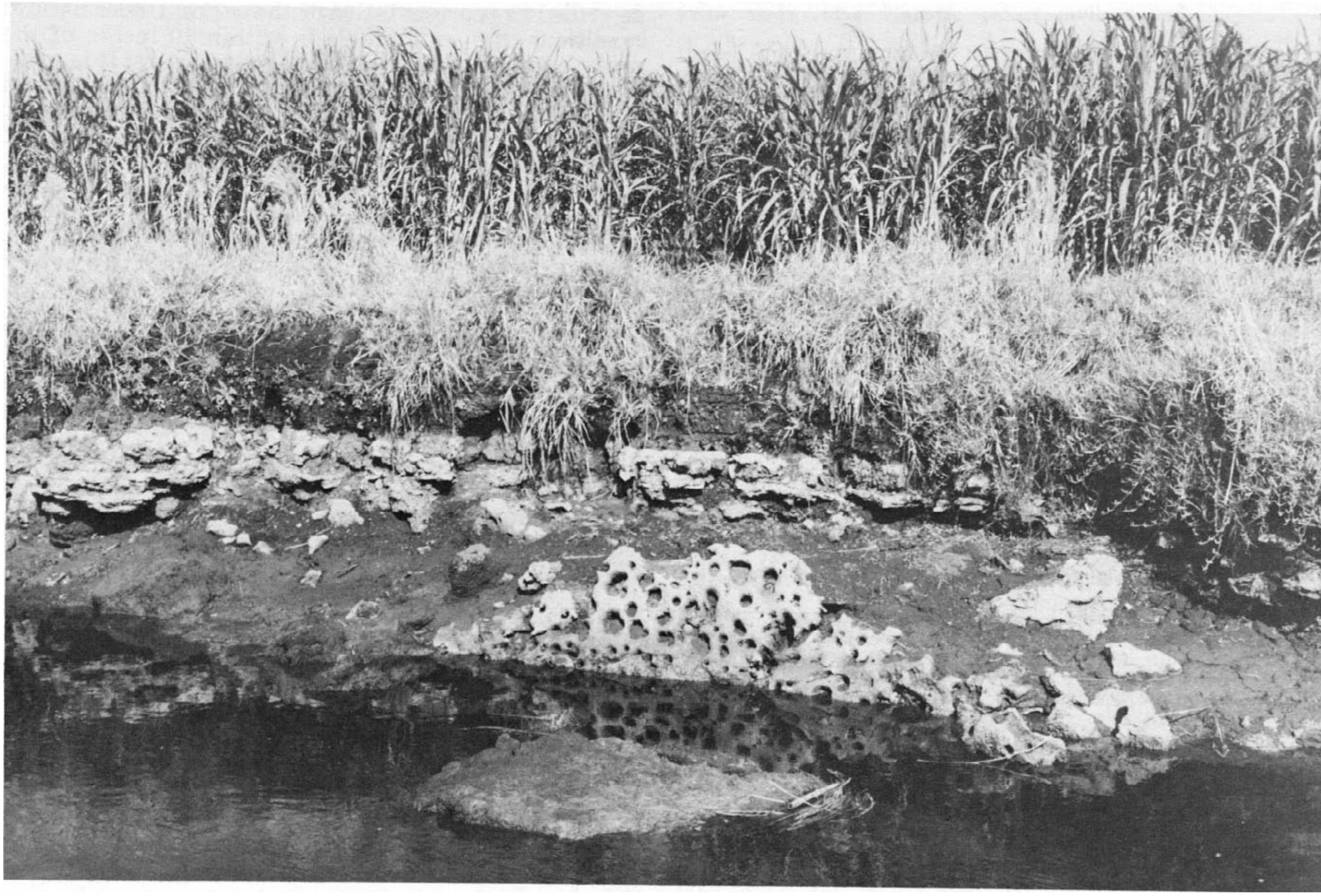

Figure 3.—**Bank of drainage ditch in Pahokee muck. The nearly level surface of the underlying limestone and the solution holes in the upturned slab can be readily seen. The crop is sugarcane.**

brown (10YR 6/3); estimated mineral content about 33 percent; slightly acid; gradual smooth boundary.

Oa3—28 to 42 inches; dark reddish brown (5YR 2/2) muck (sapric material); about 40 percent fiber, 10 percent rubbed; massive; sodium pyrophosphate extract is brown (10YR 5/3); estimated mineral content 35 percent; slightly acid; abrupt wavy boundary.

R—42 inches; hard limestone containing solution holes.

Thickness of organic material and depth to hard limestone range from 36 to 51 inches. Reaction ranges from medium acid to mildly alkaline when measured with a field test kit. The pH is more than 4.5 when measured in 0.01M CaC12. Mineral content ranges from 10 to 45 percent.

The Oa horizon is black (N 2/0; 10YR 2/1; 5YR 2/1) or dark reddish brown (5YR 2/2, 3/2, 3/3). Before rubbing, the fiber content ranges from 25 to 65 percent; after rubbing, the fiber content is 2 to 16 percent. In some pedons, a thin layer of calcareous loamy mineral material is between the Oa horizon and limestone.

Pahokee soils are associated with Terra Ceia, Torry, Okeelanta, Okeechobee, and Lauderhill soils. They have limestone within a depth of 51 inches, and Terra Ceia, Torry, and Okeechobee soils do not. Unlike Okeelanta soils, they overlie limestone rather than sandy mineral material. They are most similar to Lauderhill soils, but they have limestone at a depth of more than 36 inches, and Lauderhill soils have it above 36 inches.

Pa—Pahokee muck. This is a nearly level, very poorly drained, organic soil that rests on limestone at a depth of 36 to 51 inches. It is in broad, freshwater marshes. It has the pedon described as representative of the series. Under natural conditions, the soil is covered by water, or the water table is within 10 inches of the surface for 6 to 12 months during most years, except during extended dry periods.

Included with this soil in mapping are small areas of Lauderhill, Terra Ceia, Torry, and Okeelanta soils; soils that have a thin, sandy layer over the limestone; and soils that have a layer of more fibrous, less decomposed, organic material.

The natural vegetation is sawgrass, willow, bay, elderberry, scattered cypress and an undergrowth of ferns, pickerelweed, maidencane, and other water-tolerant plants. Some large areas are in native vegetation, but most of this soil is used for sugarcane, cultivated crops, pasture, and sod.

This soil is not suited to cultivation in its native state. If good water control is established and maintained through a system of dikes, ditches, and pumps, it is well suited to a wide variety of vegetables and

sugarcane. In many areas, however, the underlying limestone must be removed by blasting to construct ditches. In addition to maintaining the water control system, saturating the soil when crops are not growing minimizes oxidation of the organic material (fig. 4). Fertilizer and lime should be applied according to crop needs.

This soil is not suited to citrus. It has many soil properties not favorable for citrus, and the drainage needed for this crop would cause rapid deterioration of the soil.

If intensively managed, this soil is well suited to high-quality pasture of improved grasses and clover mixtures. Major management concerns are providing a water control system to remove excess surface water and to maintain the level of the water table, adequately applying fertilizer and lime as required, and carefully controlling grazing. Capability unit IIIw–12.

Palm Beach Series

The Palm Beach series consists of nearly level to sloping, excessively drained, deep, sandy soils that have a high content of shell fragments. These soils are on long, dunelike ridges generally parallel to the Atlantic coast. They formed in thick beds of marine sand and shell fragments. Under natural conditions, the water table is below a depth of 6 feet.

In a representative pedon the surface layer is dark grayish brown sand and shell fragments about 6 inches thick. The next layer is pale brown sand and shell fragments about 34 inches thick. Below this, light yellowish brown sand and shell fragments extend to a depth of more than 80 inches.

***Figure 4.*—This house was built on pilings about 50 years ago on Pahokee muck. When built, it had only two front steps, but now 11 are needed because of oxidation and subsidence of the organic material.**

Permeability is very rapid, and the available water capacity is very low throughout. Organic-matter content and natural fertility are very low.

Representative pedon of Palm Beach sand, about 100 feet south of the access road to the Lantana Public Beach area, NE1/4SE1/4 sec. 10, T. 45 S., R. 43 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; many fine roots; estimated 30 percent multicolored, sand-size shell fragments; many uncoated sand grains; moderately alkaline, calcareous; clear smooth boundary.

C1—6 to 40 inches; pale brown (10YR 6/3) sand; single grained; loose; very few medium and coarse roots; estimated 30 percent multicolored shell fragments; most sand grains uncoated; moderately alkaline, calcareous; diffuse boundary.

C2—40 to 80 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; estimated 30 percent multicolored shell fragments; sand grains uncoated; moderately alkaline, calcareous.

Reaction is mildly or moderately alkaline and weakly to strongly calcareous throughout. Pockets or lenses dominantly of shells may occur throughout the soil. The A horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or grayish brown (10YR 5/2). It contains about 5 to 35 percent sand-size shell fragments. It is 2 to 8 inches thick.

The C horizon contains shell fragments ranging from sand size to about ½ inch and from 15 to 70 percent by volume. In some pedons there are a few small, nearly white lumps of sand cemented with lime in the C horizon. The C1 horizon is grayish brown (10YR 5/2), light brownish gray (10YR 6/2), or pale brown (10YR 6/3). It has 20 to 60 percent shell fragments, mostly of sand size. The C2 horizon is lenses of sand and multicolored shells or shell fragments, or mixed sand and shells. The color of the horizon depends mostly on the color of the shells.

Palm Beach soils are associated with Canaveral, Paola, and St. Lucie soils. They are similar to Canaveral soils but have a water table deeper than 6 feet. Unlike Paola and St. Lucie soils, Palm Beach soils have shell fragments throughout.

PbB—Palm Beach-Urban land complex. This complex consists of Palm Beach sand and Urban land. About 50 to 70 percent of the complex is open land, such as lawns, vacant lots, and undeveloped areas. These areas are made up of nearly level to sloping, excessively drained, Palm Beach sand that has been graded and leveled in many places for urban development. The original soil has a pedon similar to that described as representative of the series. About 30 to 50 percent of the complex is covered by sidewalks, streets, parking lots, buildings, and other structures.

Included with the open areas of this complex in mapping are small areas of Canaveral sand that has fill material on the original surface in many places. Some of this fill material comes from the adjacent, higher Palm Beach sand during the process of leveling.

The percentage of open land and urban areas varies. A few narrow coastal ridges of Palm Beach sand remain undeveloped, but the amount of such land is being continually reduced by urban expansion. Not placed in a capability unit.

Paola Series

The Paola series consists of nearly level to sloping, excessively drained, deep, sandy soils on long, narrow,

dune-like ridges near the Atlantic coast. They formed in thick beds of sandy marine sediments. The water table is below a depth of 6 feet.

In a representative pedon the surface layer is dark gray sand about 4 inches thick. The subsurface layer is white sand about 17 inches thick. A layer of yellow sand 4 inches thick is at a depth of 21 inches. It is transitional to the subsoil, which is strong brown sand about 12 inches thick. Light yellowish brown sand extends from a depth of 37 inches to a depth of 80 inches or more.

Permeability is very rapid throughout. The available water capacity is very low. Organic-matter content and natural fertility are very low.

Representative pedon of Paola sand, about 0.4 mile west of U.S. Highway 1 on the north side of Donald Ross Road in a cutbank on the right-of-way, SW1/4 SW1/4 sec. 21, T. 41 S., R. 43 E.

A1—0 to 4 inches; dark gray (10YR 4/1) sand; single grained; loose; many fine and medium roots; very strongly acid; clear wavy boundary.

A2—4 to 21 inches; white (10YR 8/1) sand; single grained; loose; common fine and medium roots; slightly acid; gradual wavy boundary.

B1—21 to 25 inches; yellow (10YR 7/6) sand; white (10YR 8/1), light yellowish brown (10YR 6/4), and brownish yellow (10YR 6/6) splotches; single grained; loose; medium acid; clear wavy boundary.

B&A—25 to 37 inches; strong brown (7.5YR 5/8) sand; single grained; loose; tongues 1 to 3 inches in diameter extend through horizon, filled with white (10YR 8/2), yellowish brown (10YR 5/6), and light yellowish brown (10YR 6/4) sand, outer edges of tongues, 0.5 to 1.0 inch wide stained dark brown (7.5YR 4/4) by organic material, weakly cemented; medium acid; gradual wavy boundary.

B3—37 to 80 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; color gradually lightens with increasing depth; slightly acid.

Sand extends to a depth of 80 inches or more. Silt plus clay between a depth of 10 and 40 inches is less than 5 percent. Reaction is generally strongly or very strongly acid, but ranges to slightly acid during dry periods because of ocean spray.

The A1 horizon is dark gray (10YR 4/1), or gray (10YR 5/1, 6/1), and is 2 to 5 inches thick. The A2 horizon is light gray (N 7/0; 10YR 7/1, 7/2) or white (N 8/0; 10YR 8/1, 8/2) and ranges from 10 to 40 inches in thickness. Some pedons have a thin, discontinuous B1 horizon which ranges to 5 inches in thickness and is yellow (10YR 7/6, 7/8) or brownish yellow (10YR 6/6, 5/8) and has few to common splotches of white, light gray, yellow, or brown.

The B&A horizon is strong brown (7.5YR 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), or yellow (10YR 7/6, 7/8). Tongues of white sand, 1 to 3 inches in diameter extend through the horizon. The tongues have a ½- to 1-inch sheath of dark brown (7.5YR 4/4) to brown (10YR 5/3) weakly cemented sand. The B&A horizon commonly has a few coarse weakly cemented, dark reddish brown to strong brown pockets.

The B3 horizon is below a depth of 36 inches and is light yellowish brown (10YR 6/4), brown (10YR 5/3), pale brown (10YR 6/3), or very pale brown (10YR 7/3, 7/4, 8/3, 8/4).

Paola soils are associated with St. Lucie, Palm Beach, and Pomello soils. They have a B&A horizon, and St. Lucie soils do not. Unlike Palm Beach soils, they have a B&A horizon and lack shell fragments. They are better drained than Pomello soils and lack the black weakly cemented Bh horizon of Pomello soils.

PcB—Paola sand, 0 to 8 percent slopes. This nearly level to sloping, excessively drained, deep, sandy soil has yellowish layers beneath the white subsurface layer. It is on long, narrow dunelike ridges near the Atlantic coast. It has the pedon described as representative of the series. The water table is below a depth of 6 feet.

Included with this soil in mapping are small areas of St. Lucie, Palm Beach, and Pomello soils; soils that lack the thick, white, subsurface layer; and soils that have the yellowish layer at a depth greater than that described for Paola sand.

The natural vegetation is sand pine and an undergrowth of scrub oak, palmetto, and rosemary. The surface is sparsely covered by grasses, cacti, mosses, and lichens. Large areas are in native vegetation. Some areas are cleared and smoothed for urban use.

This soil is not suited to vegetables and most cultivated crops because it is droughty and has many other poor soil qualities. It is moderately well suited to citrus. In citrus groves, a cover crop of weeds and grasses is needed to keep the soil between the trees from blowing. Tillage should be kept to a minimum. Sprinkle irrigation is needed to insure the survival of young trees and a good yield of fruit from mature trees.

This soil is poorly suited to improved pasture of bahiagrass and other deep-rooted grasses. In such pastures, frequent application of fertilizer and carefully controlled grazing are needed. Capability unit VIs-1.

Pineda Series

The Pineda series consists of nearly level, poorly drained, sandy soils over loamy material. These soils are on broad, low flatwoods and in grassy sloughs. They formed in sandy and loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 1 to 6 months in most years and within 10 to 30 inches most of the remainder of each year, except during extended dry periods. Water covers depressions for 1 to 3 months.

In a representative pedon the surface layer is dark grayish brown sand about 3 inches thick. Below this is about 16 inches of yellowish brown and brownish yellow sand. The next layer is light gray sand about 15 inches thick. A grayish brown sandy loam that has vertical sandy tongues that extend from the layer above is at a depth of 34 inches. The underlying material is a mixture of light gray sand and shell fragments below a depth of 44 inches.

Permeability is rapid in the sandy layers and moderately rapid in the loamy layer. The available water capacity is very low in the sandy layers and medium in the loamy layer. Organic matter content is low, and natural fertility is low.

Representative pedon of Pineda sand, about 0.45 mile east of the Sunshine State Parkway and about 660 feet south of Forest Hill Boulevard, NE1/4NW1/4 sec. 16, T. 44 S., R. 42 E.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) sand; weak fine granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

B21ir—3 to 14 inches; yellowish brown (10YR 5/6) sand; common medium faint light yellowish brown (10YR 6/4) and few fine prominent yellowish red mottles;

single grained; loose; medium acid; gradual smooth boundary.

B22ir—14 to 19 inches; brownish yellow (10YR 6/8) sand; single grained; loose; medium acid; gradual smooth boundary.

A'2—19 to 34 inches; light gray (10YR 7/2) sand; common fine distinct yellow mottles; single grained; loose; very strongly acid; abrupt irregular boundary.

B'tg&A—34 to 44 inches; grayish brown (2.5Y 5/2) sandy loam; few medium faint light olive brown (2.5Y 5/4) mottles; massive in place, crushes to weak coarse subangular blocky structure; slightly sticky; grains are coated and bridged with clay; few vertical tongues, 1 to 2 inches wide, of A'2 horizon extend into upper 8 inches; slightly acid; clear wavy boundary.

IIC—44 to 62 inches; light gray (2.5Y 7/2) sand mixed with shell fragments; single grained; loose; estimated about 15 percent shell fragments; moderately alkaline, calcareous.

Combined thickness of the A and Bir horizons ranges from 20 to 40 inches. Reaction ranges from very strongly acid to slightly acid in the A, Bir, and A'2 horizons and from slightly acid to moderately alkaline in the B'tg&A horizon.

The A1 horizon is black (10YR 2/1), very dark gray (10YR 3/1), dark gray (10YR 4/1), dark grayish brown (10 YR 4/2), or grayish brown (10YR 5/2). The A2 horizon, if present, is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), light gray (10YR 7/1, 7/2), or white (10YR 8/1, 8/2).

The B2ir horizon is yellowish brown (10YR 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), or strong brown (7.5YR 5/6, 5/8). It commonly has mottles in shades of gray, brown, or yellow.

The A'2 horizon is dark gray (10YR 4/1; N 4/0), gray (10YR 5/1, 6/1; N 5/0, 6/0), light gray (10YR 7/1, 7/2; N 7/0; 2.5Y 7/2), dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2; 2.5Y 6/2). Some pedons do not have this horizon.

The B'tg&A horizon is dark gray (10YR 4/1; N 4/0), gray (10YR 5/1; N 5/0), light gray (10YR 7/1, 7/2; N 7/0; 2.5Y 7/2), dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2; 2.5Y 6/2) and has mottles in shades of yellow and brown. The B'tg part is sandy loam or sandy clay loam, and tongues of sand extend vertically into the horizon from above. Some pedons have a gray to light olive gray loamy sand B'3g horizon.

The IIC horizon is a gray (10YR 5/1, 6/1; N 5/0, 6/0), light gray (10YR 7/1, 7/2; N 7/0; 2.5Y 7/2), or light brownish gray (10YR 6/2) mixture of sand and shell fragments.

Pineda soils are associated with Riviera, Boca, Pinellas, Hallandale, Holopaw, Wabasso, and Oldsmar soils. They are similar to Riviera soils but have a Bir horizon above the B'tg&A horizon. Unlike Boca and Hallandale soils, they have no limestone within a depth of 40 inches. They lack the thin marl A2ca horizon of Pinellas soils. They have a Bir horizon and B'tg&A horizon within a depth of 40 inches, which Holopaw soils lack. They lack the Bh horizon of Wabasso and Oldsmar soils.

Pd—Pineda sand. This is a nearly level, poorly drained, sandy soil over loamy material. It is on broad, low flatwoods and grassy sloughs. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 1 to 6 months in most years and within 10 to 30 inches most of the remainder of each year, except during extended dry periods. Water covers depressions for 1 to 3 months.

Included with this soil in mapping are small areas of Riviera, Pinellas, Boca, and Hallandale soils; and soils that have loamy material below a depth of 40 inches.

The natural vegetation is slash pine, cabbage palmetto, scattered cypress and southern bayberry, St. Johnswort, little blue maidencane, pineland three-awn chloris, chalky bluestem, sand cordgrass, and numerous other grasses. Most areas are in natural vegetation or improved pasture.

If a water control system is installed, this soil is well suited to a variety of vegetables. In addition to drainage and irrigation, growing cover crops in fallow periods helps maintain the organic-matter content and tilth. Fertilizer and lime should be applied according to crop needs.

If well managed, this soil is moderately well suited or well suited to citrus. A water control system is needed to maintain a constant water table at a depth of 3 feet or more. Trees should be planted on broad, elevated beds and fertilizer should be applied frequently.

This soil is well suited to high-quality pasture of improved grasses and clover. A water control system that provides surface drainage and subsurface irrigation is needed to improve crop growth. Adequate fertilizer application and careful control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-4.

Pinellas Series

The Pinellas series consists of nearly level, poorly drained soils that have a sandy, calcareous subsurface layer and a loamy subsoil. These soils are in nearly level areas that border sloughs and shallow depressions. They formed in sandy and loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 1 to 3 months and within 10 to 30 inches for 2 to 6 months in most years.

In a representative pedon the surface layer is black fine sand about 4 inches thick. The subsurface layer is 4 to 36 inches thick. In the upper 6 inches it is grayish brown fine sand, in the middle 12 inches it is white fine sand and calcium carbonate, and in the lower 14 inches it is light gray fine sand. The subsoil is gray fine sandy loam 18 inches thick. The substratum is light gray sand mixed with shell fragments.

Permeability is rapid in the surface and subsurface layers, moderate in the subsoil, and rapid in the substratum. The available water capacity is very low in the upper 10 inches and medium to a depth of about 54 inches. The organic-matter content and natural fertility are low.

Representative pedon of Pinellas fine sand, in the Corbett Wildlife Management Area, about 4 miles northeast of Canal L-8, 100 feet west of main grade, SE1/4SW1/4 sec. 26, T. 41 S., R. 39 E.

A1—0 to 4 inches; black (N 2/0) fine sand; weak fine granular structure; very friable; many fine roots; many uncoated sand grains; neutral; abrupt wavy boundary.

A21—4 to 10 inches; grayish brown (10YR 5/2) fine sand; few fine distinct strong brown (7.5YR 5/6) mottles and common medium distinct dark grayish brown (10YR 4/2) mottles; single grained; loose; few fine and medium roots; common fine very dark gray and dark grayish brown streaks on old root channels; neutral; abrupt wavy boundary.

A22ca—10 to 22 inches; white (10YR 8/2) fine sand; few fine distinct yellowish brown (10YR 5/8) mottles

and common medium distinct yellow (10YR 7/8) mottles in upper part; massive, crushes to moderate medium granular structure; firm in place, friable; secondary calcium carbonate in interstices between sand grains; sand grains coated with calcium carbonate; mildly alkaline, calcareous; abrupt wavy boundary.

A23—22 to 36 inches; light gray (10YR 7/2) fine sand; single grained; loose; mildly alkaline; clear wavy boundary.

Btg—36 to 54 inches; gray (5Y 5/1) fine sandy loam; weak coarse subangular blocky structure; slightly sticky; sand grains coated and bridged with clay; common coarse pockets of light gray (10YR 6/1) fine sand; mildly alkaline; gradual wavy boundary.

IIC—54 to 60 inches; gray (10YR 6/1) fine sand mixed with white shell fragments; moderately alkaline, calcareous.

The A horizon is 20 to 40 inches thick. Reaction ranges from medium acid to mildly alkaline. The A22ca horizon is calcareous. The A1 horizon is black (10YR 2/1; N 2/0), very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), or dark grayish brown (10YR 4/2). It is 2 to 6 inches thick. The A2 horizon is gray (10YR 5/1, 6/1; N 5/0, 6/0), light gray (10YR 7/1, 7/2; N 7/0; 2.5Y 7/2), white (10YR 8/1, 8/2; N 8/0; 2.5Y 7/2), grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (10YR 6/2; 2.5Y 6/2), brown (10YR 5/3), pale brown (10YR 6/3), or very pale brown (10YR 7/3, 8/3). The A horizon generally has mottles in shades of brown, yellow, or gray. Accumulations of secondary calcium carbonate in the A22ca horizon occur as coatings on sand grains and in the interstices between sand grains. The A22ca horizon is more than 6 inches thick.

The Btg horizon is dark gray (10YR 4/1; N 4/0; 5Y 4/1), gray (10YR 5/1, 6/1; N 5/0, 6/0; 5Y 5/1, 6/1), or light gray (10YR 7/1; N 7/0; 5Y 7/1) with or without mottles, or it is dark grayish brown (10YR 4/2; 2.5Y 4/2), olive gray (5Y 4/2, 5/2), grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (10YR 6/2, 2.5Y 6/2), light olive gray (5Y 6/2), or light gray (10YR 7/2; 2.5Y 7/2; 5Y 7/2) with mottles. It is fine sandy loam or sandy clay loam. Secondary accumulations of calcium carbonate occur in root channels or as small scattered nodules in some pedons. The Btg horizon in some pedons has small to large pockets of fine sand, or loamy fine sand. Some pedons have a B3tg horizon of loamy fine sand.

The IIC horizon is a mixture of fine sand and shell fragments in varying proportions. Color is largely dependent on the shell fragments, but the fine sand has colors similar to those of the Btg horizon. A sandy C horizon overlies the layers of shell fragments in some pedons.

Pe—Pinellas fine sand. This is a nearly level, poorly drained soil that has a sandy, calcareous subsurface layer and a loamy subsoil. This soil is in nearly level areas that border sloughs and depressions. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 1 to 3 months and within 10 to 30 inches for 2 to 6 months in most years.

Included with this soil in mapping are small areas of Riviera, Pineda, Boca, Holopaw, and Hallandale soils; soils that lack a loamy subsoil within a depth of 40 inches; soils that have highly colored sand layers between the marl layer and the loamy subsoil and, in a few places, soils that have limestone within a depth of 40 inches.

The natural vegetation is slash pine, cabbage palm, saw-palmetto, inkberry, pineland three-awn, and many other grasses. Most areas of this soil are in native vegetation.

If a water control system is installed, this soil is well suited to a variety of vegetables. In addition to drainage and irrigation, the use of cover crops during fallow periods helps to maintain the organic-matter content and improve tilth. Fertilizer and lime should be applied according to crop needs.

If well managed, this soil is moderately well suited or well suited to citrus. A water control system is needed to maintain a constant water table at a depth of 3 feet or more. Trees should be planted on broad elevated beds. Fertilizer should be applied frequently.

This soil is well suited to high-quality pasture of improved grasses and clover. A water control system that provides surface drainage and subsurface irrigation is needed to improve crop growth. Adequate application of fertilizer and careful control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-4.

Pits

Pf—Pits consist of excavations from which soil and geologic material have been removed for use in road construction or for foundation purposes. Pits, locally called borrow pits, are in small to large areas in the eastern part of the county.

Included with this unit in mapping is waste material, mostly mixtures of sand and shell fragments, that are piled or scattered around the edges of the pits.

Most pits have been excavated below the normal water table and are ponded for 9 months or more each year. Most are abandoned, though excavation continues in a few places. Many of the older pits are used for fishing and as feeding areas by wading birds and waterfowl. Most of these pits can be improved for such uses by stocking with fish. A few pits serve as stock watering ponds. They have no other farming use. Not placed in a capability unit.

Placid Series

The Placid series consists of nearly level, very poorly drained, deep, sandy soils that have a thick dark surface layer. These soils are in depressions and poorly defined drainageways. They formed in thick beds of sandy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for more than 6 months during most years. Depressed areas are covered by water for more than 6 months.

In a representative pedon the surface layer is black fine sand in the upper 10 inches and is very dark gray fine sand in the lower 7 inches. The next layer is light brownish gray fine sand to a depth of 23 inches. Below this is light gray fine sand that extends to a depth of 60 inches or more.

Permeability is rapid in all layers. The available water capacity is high in the dark surface layer and low in the layers below. The organic-matter content is high, and natural fertility is medium.

Representative pedon of Placid fine sand, about 0.35 mile north of Clint Moore Road and 0.2 mile east of Military Trail, NW1/4SW1/4 sec. 36, T. 46 S., R. 43 E.

A11—0 to 10 inches; black (10YR 2/1) fine sand; few fine light gray streaks and pockets; moderate fine and

medium granular structure; friable; many fine roots; many uncoated sand grains; estimated 15 to 18 percent organic-matter content; very strongly acid; clear wavy boundary.

A12—10 to 17 inches; very dark gray (10YR 3/1) fine sand, rubbed, light gray (10YR 7/1) and black (10YR 2/1), unrubbed; common pockets of black organic matter; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; gradual irregular boundary.

C1—17 to 23 inches; gray (10YR 6/6) fine sand; common dark colored streaks in old root channels; single grained; loose; common fine roots; very strongly acid; gradual wavy boundary.

C2—23 to 60 inches; light gray (10YR 7/1) fine sand; few fine faint yellowish mottles and few faint brownish streaks in old root channels; single grained; loose; very strongly acid.

Reaction ranges from strongly to very strongly acid throughout. The A horizon is black (N 2/0; 10YR 2/1) or very dark gray (10YR 3/1) and is 10 to 20 inches thick. The C horizon is gray (10YR 5/1, 6/1; N 5/0, 6/0), grayish brown (10YR 5/2; 2.5Y 5/2), or light gray (10YR 7/1, 7/2; N 7/0). Most pedons have mottles in shades of brown and yellow and have darker colored streaks in old root channels.

Placid soils are associated with Basinger, Pompano, Anclote, Myakka, and Immokalee soils. Unlike Basinger and Pompano soils, they have a thick, dark colored A1 horizon. They are more acid than Anclote soils. Placid soils do not have the Bh horizon of Myakka and Immokalee soils.

Pg—Placid fine sand. This is a nearly level, very poorly drained, deep, sandy soil that has a thick, dark colored surface layer. This soil is on depressed areas and in poorly defined drainageways. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for more than 6 months during most years. Depressed areas are covered with water for more than 6 months.

Included with this soil in mapping are small areas of Anclote, Basinger, Myakka, and Immokalee soils; soils that have a thin organic surface layer; soils that have a black, weakly cemented layer within a depth of 30 inches; and soils that have a brown to pale brown subsoil.

The natural vegetation is pickerelweed, maidencane, ferns, St. Johnswort, and a variety of other water-tolerant grasses and sedges. Cypress, bay, and gum trees grow in some areas. Most areas of this soil are in native vegetation.

Unless drained, this soil is not suited to cultivated crops. If a water control system is installed, it is well suited to a variety of vegetables. If outlets are available, simple water control systems remove excess water in wet periods and provide for subsurface irrigation in dry periods. Drainage is generally not feasible in isolated small areas that have no natural outlet. In some areas, dikes are needed to keep out water from adjacent wet areas. In addition to drainage and irrigation, fertilizer and lime should be applied according to crop needs.

This soil is poorly suited to citrus. If drainage and water control are adequate, it is well suited to high-quality pasture of improved grasses and clover. Application of fertilizer and lime according to plant needs and control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-7.

Pomello Series

The Pomello series consists of nearly level to gently sloping, moderately well drained, deep, sandy soils that have a weakly cemented layer below a depth of 30 inches. These soils are on low knolls and ridges. They formed in thick beds of sandy marine sediments. Under natural conditions, the water table is at a depth of 24 to 40 inches for 1 to 4 months during the normal wet period and below 40 inches during the remainder of the year.

In a representative pedon the surface layer is gray fine sand about 4 inches thick. The subsurface layer is light gray and white fine sand. It extends to a depth of 44 inches. The next layer is black fine sand weakly cemented with organic matter. It is about 10 inches thick. Below this is a layer of dark reddish brown fine sand about 6 inches thick. Light yellowish brown fine sand is at a depth of 60 to 80 inches or more.

Permeability is very rapid to a depth of 44 inches, moderately rapid to a depth of 60 inches, and rapid below this. The available water capacity is medium in the weakly cemented layer and very low in all other layers. Organic-matter content and natural fertility are very low.

Representative pedon of Pomello fine sand, about 0.25 mile south of State Road 706 and about 800 feet west of Perry Avenue in Jupiter, Florida, SE1/4SW1/4 sec. 1, T. 41 S., R. 42 E.

A1—0 to 4 inches; gray (10YR 5/1) fine sand; weak fine granular structure; very friable; many fine roots; many uncoated sand grains; very strongly acid; clear smooth boundary.

A21—4 to 28 inches; white (10YR 8/1) fine sand; common coarse faint light gray (10YR 7/1) splotches; single grained; loose; common medium and coarse roots; medium acid; gradual smooth boundary.

A22—28 to 44 inches; light gray (10YR 7/1) fine sand; few to common black to very dark grayish brown streaks in old root channels; single grained; loose; few medium roots; medium acid; abrupt wavy boundary.

B2h—44 to 54 inches; black (10YR 2/1) and dark reddish brown (5YR 2/2) fine sand; many medium distinct dark gray (10YR 4/1) mottles; massive in place, parts to weak fine granular structure; very friable; darkest parts weakly cemented; slightly acid; clear wavy boundary.

B3—54 to 60 inches; dark reddish brown (5YR 3/4) and reddish brown (5YR 4/3) fine sand; single grained; loose; many uncoated sand grains; very strongly acid; gradual wavy boundary.

C—60 to 80 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; strongly acid.

Reaction ranges from very strongly acid to slightly acid. The A horizon is 30 to 50 inches thick. The A1 horizon is dark gray (10YR 4/1; N 4/0), or gray (10YR 5/1, 6/1; N 5/0, 6/0). It is 2 to 6 inches thick. The A2 horizon is light gray (10YR 7/1, 7/2; N 7/0) or white (10YR 8/1, 8/2; N 8/0). In some pedons, a transitional horizon ½ to 2 inches thick that has some uncoated sand grains is between the base of the A2 horizon and the top of the Bh horizon.

The B2h horizon is black (10YR 2/1; 5YR 2/1), dark brown (7.5YR 3/2), or dark reddish brown (5YR 2/2, 3/2, 3/3, 3/4). It is 6 to 20 inches thick and the sand grains are coated with organic matter. The B3 horizon is dark reddish brown (5YR 3/4), reddish brown (5YR 4/3, 4/4), or dark brown (7.5YR 4/2, 4/4; 10YR 3/3, 4/3) and has common to many uncoated sand grains. Some pedons have a few weakly cemented Bh fragments, and some have mottles in shades of brown and yellow in the B3 horizon.

The C horizon is commonly light gray (10YR 7/1), gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), pale brown (10YR 6/3), very pale brown (10YR 7/3, 7/4), or light yellowish brown (10YR 6/4).

Pomello soils are associated with Immokalee, Myakka, Basinger, St. Lucie, and Paola soils. They are better drained than Immokalee, Myakka, and Basinger soils. They have an A horizon more than 30 inches thick, and Myakka soils do not. They have a well developed, weakly cemented Bh horizon, and Basinger soils do not. Pomello soils are less well drained than St. Lucie and Paola soils and have a Bh horizon, which St. Lucie and Paola soils do not have.

PhB—Pomello fine sand. This is a nearly level to gently sloping, moderately well drained, deep, sandy soil that has a dark, weakly cemented layer below a depth of 30 inches. This soil is on low ridges and knolls. Slopes range from 0 to 5 percent. It has the pedon described as representative of the series. Under natural conditions, the water table is within 24 to 40 inches for 1 to 4 months during wet periods and below 40 inches during the remainder of the year.

Included with this soil in mapping are small areas of Immokalee, Myakka, Basinger, St. Lucie, and Paola soils; and soils in which the dark, weakly cemented layer is below 50 inches, or is less well developed.

The natural vegetation is slash pine, sand pine, scrub oak, saw-palmetto, inkberry, sand plum, fetterbush, pineland three-awn, and other native grasses. Most areas are in native vegetation.

This soil is generally not suited to cultivation because of poor soil properties. It is not suited to row crops or most vegetables and is poorly suited to citrus. It is poorly suited to bahiagrass and other deep-rooted, drought-resistant grasses, even if large amounts of fertilizer and lime are applied. Capability unit VIs–2.

Pompano Series

The Pompano series consists of nearly level, poorly drained, deep, sandy soils in broad, grassy sloughs, concave depressions, and drainageways. These soils formed in thick beds of sandy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 2 to 6 months in most years and within 30 inches for more than 9 months. Water covers depressions for more than 3 months in most years.

In a representative pedon the surface layer is dark grayish brown fine sand about 8 inches thick. Below this is light gray fine sand to a depth of about 32 inches. The next layer is pale brown fine sand about 20 inches thick. Below this is very pale brown fine sand that extends to a depth of 80 inches or more.

Permeability is rapid in all layers. The available water capacity is very low. Organic-matter content and natural fertility are low.

Representative pedon of Pompano fine sand, about 100 feet east of El Rio Canal and about 0.45 mile north of entrance road to Florida Atlantic University, NW1/4NE1/4 sec. 18, T. 47 S., R. 43 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) crushed fine sand; weak fine granular structure; very friable; many uncoated sand grains; extremely acid; clear wavy boundary.

C1—8 to 32 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; gradual smooth boundary.

C2—32 to 52 inches; pale brown (10YR 6/3) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

C3—52 to 80 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; very strongly acid.

Reaction ranges from extremely acid to mildly alkaline throughout. The A horizon is very dark gray (10YR 3/1; N 3/0), dark gray (10YR 4/1; N 4.0), gray (10YR 5/1; N 5/0), grayish brown (10YR 5/2; 2.5Y 5/2), or dark grayish brown (10YR 4/2; 2.5Y 4/2). It is 3 to 8 inches thick.

The C horizon is grayish brown (10YR 5/2, 2.5Y 5/2), brown (10YR 5/3), pale brown (10YR 6/3), very pale brown (10YR 7/3, 7/4), light brownish gray (10YR 6/2), gray (10YR 5/1, 6/1; N 5/0, 6/0), or light gray (10YR 7/1, 7/2). It has mottles in shades of brown or yellow.

Pompano soils are associated with Basinger, Anclote, Immokalee, Riviera, and Holopaw soils. Unlike Basinger soils, they lack a friable Bh horizon weakly stained by organic matter. Pompano soils lack the thick, dark A1 horizon of Anclote soils and the weakly cemented Bh horizon of Immokalee soils. Pompano soils are sandy to a depth of 80 inches or more, and Riviera and Holopaw soils are not.

Po—Pompano fine sand. This is a nearly level, poorly drained, deep, sandy soil in broad, grassy sloughs, concave depressions, and drainageways. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 2 to 6 months in most years and within 30 inches for more than 9 months. Water covers depressions for more than 3 months in most years.

Included with this soil in mapping are small areas of Basinger, Anclote, Immokalee, Holopaw, and Riviera soils; and soils that have a brownish yellow, ironstained layer.

The natural vegetation is southern bayberry, melaleuca, pineland three-awn, sand cordgrass, and other grasses. Scattered cypress, slash pine, and cabbage palm trees grow in some places. Some areas are in improved pasture.

Unless drained, this soil is not suited to cultivated crops. If drained and intensively managed, it is moderately well suited to vegetation. A well-designed, constructed, and maintained water control system maintains the level of the water table and provides subsurface irrigation. Frequent applications of fertilizer and lime are needed.

This soil is poorly suited to citrus. Because it is in low positions and generally has a high water table, water control is difficult. A well-designed water control system and bedding are needed if citrus is planted. Fertility is difficult to maintain because the soil is sandy and low in fertility. Frequent applications of fertilizer are needed. During dry periods, irrigation is needed to insure good yields.

If intensively managed, this soil is well suited to improved pasture of grass or grass and clover. Major management concerns are providing a water control system that is less intensive but is otherwise similar to that system required for cultivated crops, frequently applying fertilizer and lime as required, and carefully controlling grazing. Capability unit IVw–1.

Quartzipsamments, Shaped

QAB—Quartzipsamments, shaped. This mapping unit consists of nearly level to gently sloping, well

drained, deep, sandy soils in areas where natural soils have been altered by cutting down ridges and spreading the soil material over adjacent lower soils, by filling low areas above natural ground level, and by filling and shaping soil material to form golf courses. The sandy fill material may be hauled in from a distant source but is generally obtained at the site by dredging nearby water areas or by excavating to create water areas. The water table is below a depth of 60 inches.

No one pedon represents this mapping unit, but of one of the most common the surface layer is dark grayish brown sand about 6 inches thick. Next, stratified layers of gray, grayish brown, light gray, light brownish gray, and white sand in any sequence and of variable thickness are between a depth of 6 and 32 inches. Below this there is a layer of strong brown sand about 10 inches thick that has a few dark reddish brown fragments of weakly cemented sand. The next layer is grayish brown sand about 18 inches thick. Below this is a layer of white sand that extends to 80 inches or more.

Permeability is very rapid. The available water capacity is very low. Organic-matter content and natural fertility are low.

Reference pedon of Quartzipsamments, shaped, about 200 feet west of intersection of Australian Avenue and 15th Street West in the Riviera Beach Industrial Area, NE1/4NE1/4 sec. 32, T. 42 S., R. 43 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; many fine roots; many uncoated sand grains; neutral; clear smooth boundary.

C1—6 to 32 inches; distinctly stratified layers of gray (N 5/0), light gray (10YR 7/1), light brownish gray (10YR 6/2), white (10YR 8/1), and grayish brown (10YR 5/2) sand; single grained; loose; white splotches or pockets in darker layers, which are discontinuous and vary in thickness and boundary; neutral; clear wavy boundary.

C2—32 to 42 inches; strong brown (7.5YR 5/8) sand; single grained; loose; few dark reddish brown and black weakly cemented Bh fragments, splotches of dark reddish brown (5YR 3/4) sand around Bh fragments; mildly alkaline; clear wavy boundary.

C3—42 to 60 inches; grayish brown (10YR 5/2) sand; single grained; loose; neutral; clear smooth boundary.

C4—60 to 80 inches; white (10YR 8/1) sand; single grained; loose; neutral.

Reaction ranges from very strongly acid to moderately alkaline. The stratified material may occur in any sequence, and stratification is generally most evident in the upper 20 to 50 inches. In some places, buried pedons of other soils are below a depth of 20 inches. The sandy soil material has a wide range of color and may be intricately mixed rather than stratified. In some places, the soil has a high content of fragmented marl and rock.

Included with this unit in mapping are small areas that have less than 20 inches of fill material over a recognized soil. Also included in some places are soils that have a moderately high content of shell fragments and a few small areas of soils that have a water table, for brief periods, at a depth of less than 60 inches.

The soils in this mapping unit have been graded or shaped, and generally altered for urban development. Most areas have been well smoothed, and other areas are somewhat rough. Vegetation varies.

Present and future land use generally precludes use of this soil for farming. Not placed in a capability unit.

Riviera Series

The Riviera series consists of nearly level, poorly drained soils that have a loamy subsoil. These soils are on broad, low areas and in depressions. They formed in beds of sandy and loamy marine sediment. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months in most years and within 10 to 30 inches for most of the remaining year, except during extreme dry periods. Water covers depressions for more than 6 months each year.

In a representative pedon the surface layer is dark grayish brown sand about 6 inches thick. Below this is a subsurface layer of white sand about 22 inches thick that tongues (fig. 5) into a grayish brown sandy loam subsoil to a depth of about 36 inches. Gray sand and shell fragments are below a depth of about 42 inches.

Permeability is rapid to a depth of about 36 inches, moderately rapid to a depth of about 42 inches, and rapid below that. The available water capacity is low to a depth of about 28 inches, medium between a depth of 28 and 42 inches, and low below that. The organic-matter content and natural fertility are low.

Figure 5.—**A pedon of Riviera sand. Distinct tonguing of the light-colored sandy subsurface layer into the sandy loam subsoil is a characteristic of this soil.**

Representative pedon of Riviera sand, about 0.2 mile east of Blanchette Trail and 0.35 mile south of Forest Hill Boulevard, SW1/4NE1/4 sec. 17, T. 44 S., R. 42 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) sand; weak fine granular structure; very friable; many fine roots; neutral; gradual smooth boundary.

A2—6 to 28 inches; white (10YR 8/2) sand; single grained; loose; common fine roots; neutral; abrupt irregular boundary.

B&A—28 to 36 inches; grayish brown (2.5Y 5/2) sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; sand grains coated and bridged with clay; white (10YR 8/2) sandy tongues of A2 horizon 1 to 4 inches wide, 3 to 8 inches deep, and 12 to 18 inches apart, make up about 30 percent of horizon; neutral; clear wavy boundary.

B2tg—36 to 42 inches; grayish brown (2.5Y 5/2) sandy loam; common coarse faint olive brown (2.5Y 4/4) mottles; weak coarse subangular blocky structure; slightly sticky; common fine and medium roots; sand grains coated and bridged with clay; neutral; abrupt smooth boundary.

IIC—42 to 62 inches; gray (N 6/0) sand and shell fragments; single grained; nonsticky; moderately alkaline, calcareous.

The A horizon is 20 to 40 inches thick. The A1 horizon is black (10YR 2/1), very dark gray (10YR 3/1; N 3/0), very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), dark grayish brown (10YR 4/2), or gray (10YR 5/1). If black, very dark gray, or very dark grayish brown, it is less than 6 inches thick. The A2 horizon is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), light gray (10YR 7/1, 7/2), or white (10YR 8/1, 8/2). Reaction ranges from medium acid to neutral.

The B&A horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (10YR 6/2; 2.5Y 6/2), light olive gray (5Y 6/2), gray (10YR 5/1, 6/1; 5Y 6/1; N 6/0), or light gray (10YR 7/1, 7/2). The A part of this horizon has the same color range as the A2 horizon. The B part is sandy loam or sandy clay loam, and tongues of sand extend vertically from the A2 horizon. Reaction is slightly acid to moderately alkaline.

The B2tg horizon is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), gray (10YR 5/1, 6/1; N 5/0, 6/0), light brownish gray (10YR 6/2), or light gray (10YR 7/1, 7/2), and has mottles in shades of brown, yellow, olive, and gray. Reaction ranges from neutral to moderately alkaline. Texture is sandy loam or sandy clay loam. In some pedons a B3g horizon has color similar to that of the B2tg horizon and has a texture of loamy sand or sandy loam. If present, the B3g horizon is 1 to 12 inches thick.

The IIC horizon ranges in texture from loamy sand to a mixture of sand and shell fragments, and in some places it has fragments of marl or limestone.

Riviera soils are associated with Boca, Pineda, Holopaw, Oldsmar, Wabasso, Pinellas, Floridana, Tequesta, Chobee, and Hallandale soils. They lack the limestone substratum of Boca and Hallandale soils. Riviera soils have a B2tg horizon at a depth of 20 to 40 inches, and this horizon is below 40 inches in Holopaw soils. They lack the thick dark A1 horizon of Chobee and Floridana soils, the muck surface layer of Tequesta soils, the weakly cemented Bh horizon of Wabasso and Oldsmar soils, the A2ca horizon of Pinellas soils, and the Bir horizon of Pineda soils.

Ra—Riviera sand. This is a nearly level, poorly drained soil that has a thick sandy subsurface layer that tongues into a loamy subsoil at a depth of 20 to 40 inches. This soil is in broad, low areas. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months in most years and within 10 to 30 inches for most of the remaining year, except during extreme dry periods.

Included with this soil in mapping are small areas of Boca, Pineda, Pinellas, Oldsmar, Wabasso, Holopaw, and Hallandale soils. Also included are small areas of soils that lack the tonguing of the subsurface layer into the subsoil; soils that have a dark surface layer more than 6 inches thick; and soils that have a brown organic-stained layer above the subsoil layer.

The natural vegetation is saw-palmetto, slash pine, pineland three-awn, inkberry, blue maidencane, toothachegrass, chalky bluestem, scattered cabbage palm, and cypress trees. Most of this land is in native vegetation, but some large areas are in cultivated crops, citrus, and improved pasture.

If a water control system is installed, this soil is well suited to vegetables. In addition to drainage and irrigation, the growth of cover crops during fallow periods maintains organic-matter content and improves tilth. Fertilizer and lime should be applied according to crop needs.

If well managed, this soil is moderately well suited or well suited to citrus. A water control system is needed to maintain a constant water table at a depth of 3 feet or more. Planting trees on broad, elevated beds is needed. Fertilizer should be applied frequently.

This soil is well suited to high-quality pasture of improved grasses and clover. A water control system that provides surface drainage and subsurface irrigation is needed to improve crop growth. Adequate application of fertilizer and careful control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-4.

Rd—Riviera sand, depressional. This is a nearly level, poorly drained soil that has a loamy subsoil. This soil is in shallow, well defined depressions. It has a pedon similar to that described as representative of the series, but the surface layer is generally slightly thinner, less than 3 inches thick in most places. All other features are similar, except wetness. This soil is covered with up to 2 feet of water for more than 6 months each year.

Included with this soil in mapping are areas of Holopaw soils. These soils make up about 30 percent of some areas. Also included are small areas of Floridana, Tequesta, and Chobee soils.

The natural vegetation is cypress, needlegrass, St. Johnswort, corkweed, melaleuca, pickerelweed, sand cordgrass, maidencane, and water-tolerant plants. Most areas of this unit are in native vegetation.

This soil is not suitable for cultivated crops or pasture. Capability unit VIIw-1.

Ru—Riviera-Urban land complex. This complex consists of Riviera sand and Urban land. About 50 to 70 percent of the complex is open land, such as lawns and vacant lots. These areas are made up mainly of nearly level, poorly drained, Riviera sand that has about 12 inches of sandy fill material on the original surface in most places. A few small areas of Riviera sand that have not been modified are in the complex. The original soil below the fill material has a pedon similar to that described as representative of the Riviera series. About 30 to 50 percent of the complex is covered by streets, sidewalks, driveways, houses, and other structures.

Included in mapping are Pompano, Holopaw, and Riviera soils in areas that were originally depressions. These soils have about 20 inches of fill material on the surface. The fill material is dominantly sand and varying amounts of limestone, marl, and shell fragments ranging from sand size up to about 3 inches in diameter. The percentage of Riviera sand and urban areas varies.

All areas of this complex are drained and depth to the water table depends on the degree of management. Except for brief periods following heavy rain when the water table may be at a depth of less than 10 inches, it is always at a greater depth than that described for natural, undrained areas of Riviera soils.

Present land use precludes the use of this complex for farming. Not placed in a capability unit.

Sanibel Series

The Sanibel series consists of nearly level, very poorly drained, sandy soils that have a thin organic layer on the surface. These soils are in depressions, poorly defined drainageways, and on broad, low flats that are transitional to organic soils. They formed in thick beds of marine sand beneath a thin mantle of organic material that accumulated during conditions of a high water table. Under natural conditions, the water table is within 10 inches of the surface for 6 to 12 months during most years. Water covers the surface for 2 to 6 months during wet periods.

In a representative pedon a layer of black muck (sapric material) about 12 inches thick is at the surface. Below this the surface layer in the upper 3 inches is black sand and in the lower 3 inches is mixed black, very dark gray, and dark grayish brown sand. The next layer is gray sand about 14 inches thick. Below this is light brownish gray sand that extends to a depth of 60 inches or more.

Permeability is rapid. The available water capacity is very high in the organic surface layer and low in the sandy layers. The organic-matter content is high, and natural fertility is medium.

Representative pedon of Sanibel muck, about 0.6 mile east of Military Trail and 0.3 mile north of Clint Moore Road, NW1/4SE1/4 sec. 36, T. 46 S., R. 42 E.

Oa—12 to 0 inches; black (N 2/0) muck (sapric material); moderate coarse subangular blocky structure, crushes to moderate fine and medium granular structure; friable; thin waxy coatings on primary ped faces; few uncoated sand grains and small pockets of light gray sand; many fine roots; slightly acid; abrupt smooth boundary.

A11—0 to 3 inches; black (N 2/0) sand; weak fine and medium granular structure; friable; many fine roots; most sand grains well coated with organic matter, many uncoated sand grains; few streaks and small pockets of gray sand; slightly acid; clear wavy boundary.

A12—3 to 6 inches; mixed black (N 2/0), very dark gray (10YR 3/1), and dark grayish brown (10YR 4/2) sand; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear wavy boundary.

C1—6 to 20 inches; gray (10YR 6/1) sand; single grained; loose; common fine and medium roots; common black and very dark gray streaks in old root channels; slightly acid; gradual wavy boundary.

C2—20 to 60 inches; light brownish gray (10YR 6/2) sand; common fine faint brown (10YR 4/3) mottles; single grained; loose; few old roots and dark stained old root channels in upper part; slightly acid.

Reaction ranges from strongly acid to neutral throughout. The Oa horizon is black (10YR 2/1; N 2/0; 5YR 2/1); dark reddish brown (5YR 2/2, 3/2, 3/4), very dark brown (10YR 2/2), or dark brown (7.5YR 3/2). It has a mineral content ranging from 20 to 60 percent. This horizon is 8 to 16 inches thick.

Combined thickness of the A and C horizons is more than 60 inches. The A horizon is black (10YR 2/1; N 2/0), very dark gray (10YR 3/1; N 3/0), dark gray (10YR 4/1), or dark grayish brown (10YR 4/2). It is 2 to 8 inches thick. Some pedons have no A horizon, or the A horizon is a thin transitional horizon of mixed muck and sand at the bottom of the Oa horizon.

The C horizon is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), light gray (10YR 7/1, 7/2), or white (10YR 8/1, 8/2). It has few to common mottles in shades of gray, brown, and yellow.

Sanibel soils are associated with Okeelanta, Anclote, Placid, Basinger, Pompano, Immokalee, Holopaw, and Tequesta soils. They are mineral in origin rather than organic, as are Okeelanta soils. Unlike Anclote, Placid, Basinger, Pompano, Immokalee, and Holopaw soils, Sanibel soils have an Oa surface horizon 8 to 16 inches thick. They lack the Btg&A horizon of Tequesta soils.

Sa—Sanibel muck. This is a nearly level, very poorly drained, deep, sandy soil that has a thin organic layer on the surface. This soil is in depressions, drainageways, and broad flats that are transitional to the organic soils in the Everglades area. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 6 to 12 months in most years. Water covers the surface 2 to 6 months during wet periods.

Included with this soil in mapping are small areas of Okeelanta, Placid, Anclote, Holopaw, and Tequesta soils; small areas of soils that have a black or very dark gray sandy surface layer more than 8 inches thick; and areas of soils that have a dark, organic stained subsurface layer.

The natural vegetation is sawgrass, maidencane, cypress, southern bayberry, pickerelweed, ferns, sedges, and several water-tolerant grasses. Most areas are in natural vegetation, but some large areas are in improved pasture.

Unless drained, this soil is not suited to cultivated crops. If a water control system is installed, this soil is well suited to vegetables. If outlets are available, simple water control systems remove excess water in wet periods and provide subsurface irrigation in dry periods. Drainage is usually not feasible in isolated small areas that have no natural outlet. In some areas, dikes are needed to keep out water from adjacent areas. Fertilizer and lime should be applied according to the crop needs.

This soil is poorly suited to citrus, but intensive water control and high-level management help citrus grow successfully.

If drainage and water control are adequate, this soil is well suited to high-quality pasture of improved grasses and clover. Adequate application of fertilizer and lime according to plant needs and control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-10.

St. Lucie Series

The St. Lucie series consists of nearly level to sloping, excessively drained, deep, sandy soils on long, narrow, dune-like ridges and isolated knolls near the Atlantic coast. They formed in thick beds of marine or eolian sand. The water table is below a depth of 6 feet.

In a representative pedon the surface layer is gray sand about 5 inches thick. Below this is white sand that extends to a depth of 80 inches or more.

Permeability is very rapid. The available water capacity, the organic-matter content, and natural fertility are very low in all layers.

Representative pedon of St. Lucie sand, about 0.45 mile south of Lantana Road and 0.35 mile east of Congress Avenue, SE1/4NW1/4 sec. 5, T. 45 S., R. 43 E.

A—0 to 5 inches; gray (10YR 5/1) sand; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.

C—5 to 80 inches; white (10YR 8/1) sand; single grained; loose; few fine faint dark gray streaks in root channels; medium acid.

Reaction ranges from very strongly acid to slightly acid throughout, but it changes to neutral in the surface layer in some areas during dry periods, if moist air comes in from the ocean. If undisturbed, the A horizon is a mixture of organic-matter granules and light gray (10YR 7/1) or white (10YR 8/1) sand. Rubbed, it is dark gray (10YR 4/1), gray (10YR 5/1, 6/1; N 5/0, 6/0), or grayish brown (10YR 5/2). This horizon is 2 to 5 inches thick. The C horizon is light gray (10YR 7/1, 7/2; N 7/0) or white (N 8/0; 10YR 8/1) and extends to a depth of 80 inches or more.

St. Lucie soils are associated with Paola, Palm Beach, Pomello, Immokalee, and Basinger soils. They lack the strong brown B&A horizon of Paola soils. Unlike Palm Beach soils, they lack shell fragments mixed with the sand. They are better drained than Pomello, Immokalee, and Basinger soils and lack the dark Bh horizon of these soils.

ScB—St. Lucie sand, 0 to 8 percent slopes. This nearly level to sloping, excessively drained, deep, sandy soil is on long narrow, dune-like coastal ridges and on isolated knolls. This soil has the pedon described as representative of the series. The water table is below a depth of 6 feet.

Included with this soil in mapping are small areas of Paola, Palm Beach, and Pomello soils. Also included are small areas of soils that have either a dark-colored, organic-stained layer, or a brownish yellow, iron-stained layer within a depth of 80 inches. In a few places are soils that have a seasonally high water table within a depth of 6 feet.

The natural vegetation is sand pine, scrub oak, saw-palmetto, rosemary, cacti, reindeer moss, and sparse clumps of pineland three-awn and natalgrass. Large areas are in native vegetation, and some areas have been cleared for future urban development.

This soil is not suited to vegetables and other cultivated crops, improved pasture, or citrus. Capability unit VIIs–1.

SuB—St. Lucie-Urban land complex. This complex consists of St. Lucie sand and Urban land. About 50 to 70 percent of this complex is open land, such as lawns, vacant lots, and playgrounds. These areas are made up of nearly level to sloping, excessively drained St. Lucie soils. In places, these soils have been modified by cutting, grading, or shaping for urban development. About 30 to 50 percent of the complex is covered by streets, sidewalks, driveways, patios, buildings, and other structures.

The rest of the complex is made up of Paola and Pomello soils. These soils may also be modified in places, but the pedons are similar to that described as representative of their respective series. The percentage of urban areas and open land varies.

Present land use precludes use of this complex for farming. Not placed in a capability unit.

Tequesta Series

The Tequesta series consists of nearly level, very poorly drained soils that have a thin organic layer overlying a mineral soil that has a sandy surface layer, a sandy subsurface layer, and a loamy subsoil. These soils are on broad, low flats and in marshes and depressions. They formed in sandy and loamy marine sediment under conditions favorable for the accumulation of hydrophytic plant remains. Under natural conditions, these soils are covered by water for 4 to 6 months in most years. The water table is within 10 inches of the surface for 6 to 12 months during most years.

In a representative pedon a layer of black, well-decomposed muck about 12 inches thick is at the surface. Below this is a surface layer of dark gray fine sand about 13 inches thick. The subsurface layer is dark grayish brown fine sand about 19 inches thick. Below this is a fine sandy loam subsoil that has tongues of fine sand from the layer above. It is grayish brown and about 28 inches thick. A substratum of mixed light gray sand and shell fragments is below a depth of about 60 inches.

Permeability is rapid in the organic layer, sandy surface layer, and substratum and is moderate to moderately rapid in the loamy subsoil. The available water capacity is very high in the organic layer, low in the surface layer, and medium in the subsoil. Natural fertility is medium.

Representative pedon of Tequesta muck, about 3.75 miles south of State Road 80 and 0.7 mile west of Ousley Farm Road, NW1/4SW1/4 sec. 19, T. 44 S., R. 41 E.

Oap—12 to 0 inches; black (N 2/0; 5YR 2/1) muck (sapric material); less than 5 percent fiber rubbed; moderate coarse subangular blocky structure; friable; common medium pockets of dark reddish brown (5YR 2/2) muck; few uncoated sand grains; strongly acid; clear wavy boundary.

A1—0 to 13 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine and medium streaks of black (10YR 2/1) sand; few pockets of black (N 2/0) muck (sapric material); few coarse pockets of light gray (10YR 7/1) fine sand; neutral; gradual wavy boundary.

A2—13 to 32 inches; dark grayish brown (10YR 4/2) fine sand; common medium distinct gray (10YR 5/1) mottles; single grained; loose; many fine black streaks in old root channels; neutral; abrupt wavy boundary.

Btg&A—32 to 60 inches; grayish brown (2.5Y 5/2) fine sandy loam; common medium faint dark grayish brown (10YR 4/2) mottles; weak coarse subangular blocky structure; slightly sticky, plastic; sand grains coated and bridged with clay; few dark

grayish brown (10YR 4/2) and gray (10YR 5/1) fine sand tongues extend down from the A2 horizon; tongues ½ to 2 inches wide and 6 to 12 inches deep; mildly alkaline; clear wavy boundary.

IIC—60 to 70 inches; light gray (10YR 7/2) mixed sand and shell fragments; single grained; few cemented nodules up to 1 inch in size; moderately alkaline, calcareous.

Reaction ranges from strongly acid to neutral in the Oa and A horizons and from slightly acid to moderately alkaline in the Btg&A and IIC horizons.

The Oa horizon is black (N 2/0; 10YR 2/1; 5YR 2/1), or dark reddish brown (5YR 2/2, 3/2, 3/3, 3/4) muck (sapric material) or mucky peat (hemic material) and is 6 to 16 inches thick.

The A horizon is 20 to 40 inches thick. The A1 horizon is black (10YR 2/1), very dark gray (10YR 3/1), or dark gray (10YR 4/1) and is 4 to 14 inches thick. Where it is black or very dark gray the A1 horizon is less than 10 inches thick. This horizon commonly has pockets of black muck and streaks or pockets of sand in shades of gray. The A2 horizon is dark gray (10YR 4/1; N 4/0), gray (10YR 5/1, 6/1; N 5/0, 6/0), dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2; 2.5Y 6/2) with few to common mottles in shades of gray and brown.

The Btg&A horizon is dark gray (10YR 4/1, N 4/0), gray (10YR 5/1, 6/1; N 5/0, 6/0; 5Y 5/1, 6/1), dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (10YR 6/2), olive gray (5Y 5/2), or light olive gray (5Y 6/2), and has mottles in shades of brown, yellow, and olive. The A part of the horizon has the same color range as the A2 horizon. The Btg part is fine sandy loam or sandy clay loam. Tongues of fine sand extend vertically into the Btg&A horizon from the A2 horizon.

The IIC horizon is sand, loamy sand, or a mixture of sand and shell. In some pedons it is absent, and the Btg&A horizon overlies a B3g horizon of similar color. If present, the IIC horizon is fine sandy loam or sandy clay loam and has lenses and streaks of sand or loamy sand.

Tequesta soils are associated with Okeelanta, Sanibel, Holopaw, Floridana, Riviera, Chobee, Winder, and Jupiter soils. They are of mineral origin rather than organic origin, as are Okeelanta soils. They have a loamy Btg&A horizon that Sanibel soils lack. Tequesta soils have a surface Oa horizon, 6 to 16 inches thick, and Holopaw, Floridana, Riviera, Chobee, Winder, and Jupiter soils do not.

Ta—Tequesta muck. This is a nearly level, very poorly drained soil that has a thin organic layer on the surface overlying a mineral soil that has a sandy surface layer and a loamy subsoil. This soil is on broad, low flats and in marshes and depressions. Under natural conditions, this soil is covered by water for 4 to 6 months in most years. The water table is within 10 inches of the surface for 6 to 12 months during most years.

Included with this soil in mapping are small areas of Okeelanta, Sanibel, Riviera, Winder, Chobee, Holopaw, and Floridana soils. Also included are soils that have a thick, dark, sandy layer beneath the muck surface layer; soils that have a loamy subsoil at a depth of less than 20 inches below the surface of the mineral soil; and soils that have limestone beneath the loamy subsoil.

The natural vegetation is needlegrass, pickerelweed, maidencane, ferns, southern bayberry, and scattered cypress trees. Most areas of this soil are in natural vegetation, but some large areas are used for improved pasture and sod.

Unless drained, this soil is not suited to cultivated crops. If a water control system is installed, it is well suited to vegetables. If outlets are available, simple water control systems remove excess water in wet periods and provide subsurface irrigation in dry periods. Drainage is generally not feasible in isolated small areas that have no natural outlet. In some areas, dikes are needed to keep out water from adjacent areas. In addition to drainage and irrigation, fertilizer and lime should be applied according to crop needs.

If drainage and water control are adequate, this soil is well suited to high-quality pasture of improved grasses and clover. Adequate application of fertilizer and lime according to plant needs and control of grazing are needed to maintain healthy plant growth. Capability unit IIIw–9.

Terra Ceia Series

The Terra Ceia series consists of nearly level, very poorly drained, organic soils in broad, fresh water marsh areas. They formed in thick deposits of well-decomposed remains of hydrophytic plants. Under natural conditions, the soil is covered by water, or the water table is within 10 inches of the surface for 6 to 12 months in most years, except during extended dry periods.

In a representative pedon the surface layer is black muck (sapric material) about 8 inches thick. Below this is dark reddish brown muck that extends to a depth of 65 inches or more.

Permeability is rapid. The available water capacity is very high, and natural fertility is moderate.

Representative pedon of Terra Ceia muck, about 3.0 miles east of U.S. Sugar Corporation mill at Bryant, Florida, and 2.75 miles north of U.S. Highway 98, NE1/4NE1/4 sec. 6, T. 42 S., R. 38 E.

Oap—0 to 8 inches; black (N 2/0) unrubbed and rubbed muck (sapric material); less than 5 percent fiber; weak fine and medium granular structure; very friable; common fine roots; about 17 percent mineral material; medium acid (pH 5.7 in 1:1 water, 5.3 in 0.01M CaC12); clear wavy boundary.

Oa2—8 to 65 inches; dark reddish brown (10YR 2/2) unrubbed and rubbed sapric material (muck); about 30 percent fiber, 10 percent rubbed; fracture faces resemble weak medium subangular blocky structure; friable; slightly acid (pH 6.3 in 1:1 water, 5.8 in 0.01M CaC12).

The Oa horizon is more than 51 inches thick. Reaction ranges from medium acid to moderately alkaline when measured with a field test kit. The pH is more than 4.5 if measured in 0.01M CaC12. Mineral content ranges from about 5 to 40 percent. The Oap horizon is black (N 2/0; 10YR 2/1; 5YR 2/1) or dark reddish brown (5YR 2/2, 3/2) and is 6 to 12 inches thick. The Oa2 horizon is black (N 2/0; 10YR 2/1; 5YR 2/1), dark reddish brown (5YR 2/2, 3/2, 3/3), or very dark brown (10YR 2/2) and extends to a depth below 51 inches. The unrubbed fiber content commonly ranges from 25 to 45 percent, but may range to 65 percent. The rubbed fiber content is 2 to 16 percent. Many pedons have a dark reddish brown (5YR 2/2, 3/2, 3/3, 3/4) Oe horizon below a depth of 51 inches. Sandy, loamy, or clayey mineral material mixed with shell fragments or limestone underlie the organic material.

Terra Ceia soils are associated with Torry, Okeechobee, Okeelanta, Pahokee, and Lauderhill soils. They have a mineral content of less than 40 percent within a depth of 36 inches, and Torry soils do not. Unlike Okeechobee soils, Terra Ceia soils have an Oa horizon that extends to below a depth of 51 inches. They lack the mineral IIC horizon that is within a depth of 51 inches in Okeelanta soils, and the

limestone that is above a depth of 51 inches in Pahokee and Lauderhill soils.

Tc—Terra Ceia muck. This is a nearly level, very poorly drained, deep, organic soil. This soil is in broad, freshwater marsh areas. It formed in thick deposits of hydrophytic plant remains. It has the pedon described as representative of the series. Under natural conditions, the soil is covered by water, or the water table is within 10 inches of the surface for 6 to 12 months in most years, except during extended dry periods.

Included with this soil in mapping are small areas of Pahokee, Okeelanta, Okeechobee, and Torry soils; and small areas of soils that have a layer of more fibrous, less decomposed organic material more than 12 inches thick within a depth of 51 inches.

The natural vegetation is sawgrass, willow, elderberry, scattered sweet bay and cypress trees, and undergrowth of fern, pickerelweed, sedges, and water-tolerant grasses. Most areas of this soil are in sugarcane, truck crops, or improved pasture.

This soil is not suited to cultivation in its native state, but if good water control is established and maintained through a system of ditches, dikes, and pumps, the soil is well suited to vegetables and sugarcane. In addition to maintaining the water control system, saturating the soil when crops are not growing minimizes oxidation of the organic material. Fertilizer and lime should be applied according to crop needs.

This soil is not suited to citrus. It has many soil properties unfavorable for citrus.

If intensively managed, this soil is well suited to high-quality pasture of improved grasses and clover mixtures. Major management concerns are providing a water control system to remove excess surface water and to maintain the level of the water table, adequately applying fertilizer and lime as required, and carefully controlling grazing. Capability unit IIIw–13.

Tidal Swamp, Mineral

TM—Tidal swamp, mineral, is nearly level, very poorly drained, sandy material that supports a dense growth of mangrove trees. It is only near the coast along the Intracoastal Waterway, around the edges of Lake Worth, and along the edges of the Loxahatchee River and its tributaries. It consists of sandy marine sediments that are flooded by salt or brackish water during daily high tides.

Permeability is rapid in all layers. The available water capacity is high in the surface layer and low below that. Natural fertility is low.

The surface layer is black, very dark gray, or very dark grayish brown and is 10 inches or more thick. It is mucky sand or mucky loamy sand. Reaction ranges from slightly acid to strongly alkaline. In many places, the surface layer is fibrous muck 4 to 6 inches thick.

The underlying material is black, very dark gray, very dark grayish brown, dark gray, gray, grayish brown, or brown sand, fine sand, or loamy sand. Reaction ranges from extremely acid to mildly alkaline. In places, the content of shell fragments ranges to 10 percent.

Included in mapping are areas that have a shell content ranging to 50 percent or more; areas that have a surface layer of silt loam or silty clay loam marl that ranges to 12 inches thick; and a few areas that have a layer of muck at the surface more than 6 inches thick. Also included are small areas that have a dark surface layer less than 10 inches thick and a few places where shelly limestone is at a depth below 40 inches.

Shallow mosquito control ditches have been dug in all areas of this unit. It is not suited to crops or pasture. It is suited mainly to recreation and wildlife habitat. It provides feeding and nesting grounds for wading birds and breeding grounds for other wildlife. Capability unit VIIIw–1.

Tidal Swamp, Organic

TO—Tidal swamp, organic, is nearly level, very poorly drained, organic material that supports a dense growth of mangrove trees. It is near the coast along the Intracoastal Waterway. It consists of thick layers of well-decomposed plant remains. In most places, there is a layer of marl at a depth of 8 to 20 inches. It is flooded by salt or brackish water during daily high tides. Permeability is rapid in the organic layers and moderately rapid in the marl layer. The available water capacity is very high.

The organic material has a strong sulfur odor in some places, and no noticeable odor in others. The surface layer is black muck (sapric material) and is 8 to 20 inches thick. Reaction ranges from neutral to strongly alkaline. Below this in most places there is a layer of soft marl. It commonly has numerous brown organic fibers and ranges to 12 inches in thickness. Reaction is moderately alkaline. In some places there is no marl layer.

The underlying organic material is black, dark reddish brown, or dark brown muck (sapric material). It extends below a depth of 51 inches. This material may be made up of alternate layers of these same colors. In places, there are pockets or lenses of more fibrous, less decomposed, organic material. Reaction ranges from neutral to moderately alkaline.

Included in mapping are small areas of Okeelanta soils and small areas where the marl layer is on the surface.

Mosquito control ditches have been dug in all areas of this unit. It is not suited to crops or pasture. It is suited mainly to recreation and wildlife habitat. It provides feeding and nesting grounds for wading birds and breeding grounds for other wildlife. Capability unit VIIIw–1.

Torry Series

The Torry series consists of nearly level, very poorly drained, deep, organic soils that have a high content of fine textured mineral material. These soils are in large freshwater marshes. They formed in the remains of hydrophytic plants mixed with a high content of fine mineral material. Under natural conditions, the soil is covered with water, or the water table is within 10 inches for 6 to 12 months in most years, except during extended dry periods.

In a representative pedon the surface layer is black muck (sapric material) about 12 inches thick and has a mineral content of about 70 percent. The next layer is a sticky black muck that has about 60 percent mineral material. It extends to a depth of about 36 inches. Below this is black muck that has a mineral content of about 35 percent and extends to a depth of about 65 inches. Hard limestone is at a depth of about 65 inches.

Permeability is moderate to a depth of 36 inches and rapid below that. The available water capacity is very high in all layers. Natural fertility is high.

Representative pedon of Torry muck 3.12 miles south of State Road 717 and Pelican Lake and about 100 feet west of the U.S. Sugar Corporation railroad, NE1/4NW1/4 sec. 2, T. 43 W., R. 37 E.

Oap—0 to 12 inches; black (N 2/0) muck (sapric material); less than 5 percent fiber unrubbed; moderate fine and medium granular structure; friable; mineral content 70 percent; slightly acid; gradual smooth boundary.

Oa2—12 to 36 inches; black (N 2/0) muck (sapric material); less than 5 percent fiber unrubbed; massive, breaks to strong coarse subangular blocky structure; very sticky; mineral content 60 percent; slightly acid; gradual smooth boundary.

Oa3—36 to 65 inches; black (N 2/0) muck (sapric material); about 20 percent fiber, less than 5 percent rubbed; massive; slightly sticky; mineral content 35 percent; strongly acid; abrupt wavy boundary.

R—65 inches; hard limestone.

Thickness of the organic material and depth to limestone range from 51 to 80 inches or more. Reaction ranges from strongly acid to neutral if measured in 0.01M CaC12.

The Oap and Oa2 horizons are black (N 2/0; 10YR 2/1; 5YR 2/1) or dark reddish brown (5YR 2/2, 3/2, 3/3). Fiber content ranges from 2 to 16 percent but is commonly less than 5 percent. Mineral content ranges from 40 to 70 percent and consists primarily of clay.

The Oa3 horizon is black (N 2/0; 10YR 2/1; 5YR 2/1) or dark reddish brown (5YR 2/2, 3/2, 3/3). Fiber content is less than 50 percent unrubbed and 2 to 16 percent rubbed. This horizon has a mineral content of 10 to 40 percent. In some pedons, a layer of light gray loamy or clayey marl, 2 to 6 inches thick, is at the base of the Oa3 horizon and above the limestone.

Torry soils are associated with Terra Ceia, Pahokee, and Okeelanta soils. Unlike these soils, Torry soils have an Oa horizon that has a high content of fine mineral material to a depth of 36 inches. They lack the limestone that is within a depth of 51 inches in Pahokee soils, and they lack the sandy IIC horizon 12 inches or more thick that is above a depth of 51 inches in Okeelanta soils.

Tr—Torry muck. This is a nearly level, very poorly drained, deep, organic soil in broad, freshwater marshes. This soil formed in well-decomposed remains of hydrophytic plants mixed with a high content of fine textured mineral material. It has the pedon described as representative of the series. Under natural conditions, the surface is covered with water, or the water table is within 10 inches for 6 to 12 months in most years, except during extended dry periods.

Included with this soil in mapping are small areas of Terra Ceia, Pahokee, and Okeelanta soils; soils that have a thin layer, or layers, of more fibrous, less well-decomposed organic material; and a few small areas of fine textured mineral soils that have a high organic-matter content.

There are no areas of this soil in native vegetation. Most areas are used for sugarcane. Other areas are used for cultivated crops and improved pasture or are developed for urban use.

This soil is not suited to cultivated crops in its natural state. If good water control is established and maintained through a system of ditches, dikes, and pumps, this soil is well suited to vegetables and sugarcane. In addition to maintaining the water control system, saturating the soil when crops are not growing minimizes oxidation of the organic material. Fertilizer and lime should be applied according to crop needs.

This soil is not suited to citrus. It has many soil properties unfavorable for citrus, and the drainage needs of this crop cause the soil to rapidly deteriorate.

If intensively managed, this soil is well suited to high-quality pasture of improved grasses and clover mixtures. Major management concerns are providing a water control system to remove excess surface water and to maintain the level of the water table, adequately applying fertilizer and lime as required, and carefully controlling grazing. Capability unit IIIw-14.

Udorthents

UD—Udorthents. These soils consist of nearly level to steep, excessively drained, unconsolidated geologic material. They formed in material excavated in the construction of canals and deposited along the banks in long narrow ridges. This material is shaped to form levees that have side slopes of about 35 percent and narrow, flat tops that are used as roadways, or the material is used for final covering of sanitary land fills and forms broad, nearly level areas that have short, steep side slopes. They have no water table within 60 inches.

No one pedon represents this mapping unit, but the surface layer of one of the more common ones is grayish brown and dark grayish brown fine sand about 7 inches thick. It has numerous small shell and rock fragments. The underlying material consists of large limestone boulders and cobbles that have interstices filled with fine sand, fine carbonatic material, and shell and rock fragments.

Permeability is generally rapid but varies from place to place. The available water capacity is low.

Reference pedon of Udorthents, at intersection of Hillsborough Canal and Conservation Areas 1 and 2A:

A—0 to 7 inches; grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) fine sand; single grained; loose; many fine roots in upper 2 inches; estimated 30 percent shell fragments and rock fragments up to 1 inch in diameter; few cobbles; moderately alkaline, calcareous; clear irregular boundary.

R—7 to 80 inches; large limestone boulders, some cobbles; interstices filled with fine sand, powdery carbonates, and small shell and rock fragments; moderately alkaline, calcareous.

The A horizon is 1 inch to 24 inches thick, but in most pedons it is less than 10 inches thick. It is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), dark brown (10YR 3/3, 4/3), dark gray (10YR 4/1), dark grayish brown (10YR 4/2), gray (10YR 5/1, 6/1), grayish brown (10YR 5/3), light brownish gray (10YR 6/2), pale brown (10YR 5/2), brown (10YR 5/3), light brownish gray (10YR 6/2), pale brown (10YR 6/3), light gray (10YR 7/1, 7/2), or very pale brown (10YR 7/3). It is sand or fine sand in most pedons, though in some, fine, powdery calcium car-

bonate is dominant. Content of shell fragments ranges from 0 to 60 percent, but usually is about 20 to 50 percent. Rock fragments and cobbles range from few to many. Reaction is moderately alkaline.

The R horizon consists primarily of fragmented limestone in the form of small to large boulders, cobbles, and smaller rock fragments that have interstices filled with variable colored sand, fine sand, shell fragments, and fine calcium carbonate material. In areas of sanitary land fill, this horizon is generally not present, and the A horizon or C horizon rests directly on refuse.

On Hoover Dike, the major area of this unit, the soil has an improved grass cover in most places. In other areas, the soil has only a sparse cover of native grasses and weeds. Because of present land use this soil can not be used for farming. Not placed in a capability unit.

Urban Land

Ur—Urban land consists of areas that are 60 to more than 75 percent covered with streets, buildings, large parking lots, shopping centers, industrial parks, airports, and related facilities. Other areas, mostly lawns, parks, vacant lots, and playgrounds, are generally altered to such an extent that the former soils cannot be easily recognized and are in tracts too small to be mapped separately. Not placed in a capability unit.

Wabasso Series

The Wabasso series consists of nearly level, poorly drained, sandy soils that have a black, weakly cemented sandy layer over loamy material. These soils are in broad, flatwoods areas. They formed in thick beds of sandy marine sediment and the underlying loamy material. Under natural conditions, the water table is within 10 inches for 1 to 4 months during most years. It is between 10 and 40 inches most of the remainder of each year, except during extended dry periods.

In a representative pedon the surface layer is black fine sand about 8 inches thick. The subsurface layer is gray and light gray fine sand about 14 inches thick. The next layer is black fine sand, weakly cemented with organic matter, about 10 inches thick. Below this is a subsoil of brown and very dark grayish brown fine sandy loam about 6 inches thick. Below this is light gray sand and shell fragments that extend to a depth of 72 inches or more.

Permeability is rapid to a depth of 22 inches, moderate to 38 inches, and rapid below this. The available water capacity is low to very low in the upper 22 inches and below 38 inches. Between a depth of 22 and 38 inches it is medium. The organic-matter content and natural fertility are low.

Representative pedon of Wabasso fine sand, about 5 miles north of Okeechobee Road and about 100 feet east of Royal Palm Beach Boulevard, SE1/SWI/4 sec. 2, T. 43 S., R. 41 E.

A11—0 to 4 inches; black (N 2/0) fine sand; weak fine granular structure; very friable; many fine and medium roots; extremely acid; clear wavy boundary.

A12—4 to 8 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; many uncoated sand grains; extremely acid; gradual wavy boundary.

A2—8 to 22 inches; mixed gray (N 5/0) and light gray (10YR 7/1) fine sand; single grained; loose; common fine roots; extremely acid; abrupt smooth boundary.

Bh—22 to 32 inches; black (10YR 2/1) fine sand grading to dark reddish brown (5YR 3/3) in lower part; massive in place, crushes to moderate fine granular structure; weakly cemented; few fine and medium roots; sand grains well coated with organic matter; strongly acid; abrupt wavy boundary.

Bt—32 to 38 inches; brown (10YR 4/3) and very dark grayish brown (10YR 3/2) fine sandy loam; common medium distinct dark grayish brown (2.5Y 4/2) mottles; weak coarse subangular blocky structure; slightly sticky, slightly plastic; sand grains coated and bridged with clay; many black streaks in old root channels; slightly acid; abrupt wavy boundary.

IIC—38 to 72 inches; light gray (10YR 7/1) sand and shell fragments in about equal amounts; common bodies of gray sandy clay loam that have interstices filled with carbonates; massive; moderately alkaline, calcareous.

The A1 horizon is black (10YR 2/1; N 2/0), very dark gray (10YR 3/1; N 3/0), or dark gray (10YR 4/1: N 4/0). It is 4 to 8 inches thick. The A2 horizon is gray (10YR 5/1, 6/1; N 5/0, 6/0), light gray (10YR 7/1, 7/2; N 7/0), or light brownish gray (10YR 6/2). The A horizon is less than 30 inches thick. Reaction ranges from extremely acid to strongly acid.

The Bh horizon is black (10YR 2/1; N 2/0; 5YR 2/1) or dark reddish brown (5YR 2/2, 3/2, 3/3, 3/4). It is 4 to 14 inches thick. Sand grains are well coated and weakly cemented with organic matter. In some pedons the upper boundary is irregular, and the horizon may have coarse pockets or tongues filled with A2 horizon material extending into it. Reaction ranges from very strongly acid to neutral.

In some pedons there is an A'2 horizon between the Bh and B't horizons. It is gray (10YR 5/1, 6/1), light gray (10YR 7/1, 7/2), grayish brown (10YR 5/2), light grayish brown (10YR 6/2), brown (10YR 5/3), or pale brown (10YR 6/3).

The Bt horizon begins within a depth of 40 inches. It is gray (10YR 5/1, 6/1), light gray (10YR 7/1, 7/2), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), brown (10YR 4/3, 5/3), or pale brown (10YR 6/3) fine sandy loam or sandy clay loam, and in places it has few to many mottles in shades of gray, brown, or yellow. Some pedons have black or very dark gray organic stains in root channels, and some pedons have a few lenses or pockets of sand or loamy sand. Reaction ranges from medium acid to moderately alkaline. The Bt horizon overlies brownish fine sandy loam or loamy fine sand in a few places.

The IIC horizon is generally a mixture of sand and shell fragments that has lenses or pockets of loamy sand or sandy loam. Limestone fragments are mixed with the shell in some pedons.

Wabasso soils are associated with Oldsmar, Immokalee, Myakka, Riviera, Pineda, Boca, and Pinellas soils. Unlike Oldsmar soils, they have a Bh horizon within a depth of 30 inches and a Bt horizon within a depth of 40 inches. Wabasso soils have a Bt horizon that Immokalee soils lack. Unlike Riviera, Pineda, Boca, and Pinellas soils, they have a Bh horizon.

Wa—Wabasso fine sand. This is a nearly level, poorly drained, sandy soil that has a black weakly cemented sand layer over loamy material. This soil is in broad, flatwoods areas. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 1 to 4 months during most years and between 10 and 40 inches most of the remainder of each year, except during extended dry periods.

Included with this soil in mapping are small areas of Oldsmar, Boca, Riviera, Pinellas, Pineda, Immokalee, and Myakka soils; areas of soils in which the black, weakly cemented layer is slightly below a depth of 30

inches or the loamy layer is slightly deeper than 40 inches; and in a few places, areas of soils that have a dark colored surface layer more than 8 inches thick.

The natural vegetation includes slash pine, cabbage palm, saw-palmetto, southern bayberry, runner oak, and pineland three-awn. Most areas are still in native vegetation, though some large areas are used for truck crops, citrus, and improved pasture.

If a water control system is installed, this soil is well suited to vegetables. In addition to drainage and irrigation, the growth of cover crops during fallow periods maintains organic-matter content and improves tilth. Fertilizer and lime should be applied according to crop needs.

If well managed, this soil is moderately well suited or well suited to citrus. A water control system is needed to maintain the water table at a depth of 3 feet or more. Trees should be planted on broad, elevated beds. Frequent application of fertilizer is a major management concern.

This soil is well suited to high-quality pasture of improved grasses and clover. A water control system that provides surface drainage and subsurface irrigation is needed to improve crop growth. Adequate fertilizer application and careful control of grazing are needed to maintain healthy plant growth. Capability unit IIIw-3.

Winder Series

The Winder series consists of nearly level, poorly drained soils that have a loamy subsoil within a depth of 20 inches below the soil surface. They are on broad, low flats and in depressions and poorly defined drainageways. They formed in sandy and loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 2 to 6 months during most years. Some areas are flooded for periods of a few days to about 3 months.

In a representative pedon the surface layer is black fine sand about 2 inches thick. The subsurface layer is light gray and light brownish gray fine sand that extends to a depth of about 16 inches. The subsoil is gray fine sandy loam about 8 inches thick that has tongues of fine sand from the layer above. Below this is a layer of gray loamy fine sand about 6 inches thick also containing tongues of fine sand. The substratum is a mixture of gray fine sand and white shell fragments.

Permeability is rapid to a depth of 16 inches, moderate between 16 and 24 inches, and rapid below that. The available water capacity is medium in the loamy subsoil layer and low to very low in all other layers. The organic-matter content and natural fertility are low.

Representative pedon of Winder fine sand, about 0.25 mile west of C-18 Canal and 100 feet south of P.G.A. Boulevard, NE1/4NW1/4 sec. 8, T. 42 W., R. 42 E.

A1—0 to 2 inches; black (10YR 2/1) fine sand; weak fine and medium granular structure; very friable; many fine roots; estimated 20 percent organic-matter content; many uncoated sand grains; slightly acid; abrupt smooth boundary.

A21—2 to 11 inches; gray (10YR 6/1) fine sand; common fine faint light brownish gray mottles; single grained; loose; common very dark gray and dark grayish brown streaks in root channels; neutral; clear wavy boundary.

A22—11 to 16 inches; light brownish gray (10YR 6/2) fine sand; common fine distinct dark grayish brown mottles; single grained; loose; neutral; abrupt irregular boundary.

B2tg&A—16 to 24 inches; gray (5Y 5/1) fine sandy loam; few fine distinct yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) mottles, common medium faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; slightly sticky, plastic; sand grains coated and bridged with clay; tongues of light brownish gray (10YR 6/2) fine sand, 1 to 2 inches in diameter and approximately 6 inches apart in all directions, extend through horizon and have few medium faint light gray (10YR 7/2) mottles and common small pockets of dark grayish brown loamy sand; neutral; gradual wavy boundary.

B3&A—24 to 30 inches; gray (5Y 5/1) loamy fine sand; few fine faint grayish brown mottles; weak subangular blocky structure; slightly sticky; tongues fewer but similar to those in horizon above; few medium pockets of white shell fragments in lower part; moderately alkaline; clear smooth boundary.

IICg—30 to 50 inches; gray (5Y 5/1) mixture of fine sand and shell fragments; moderately alkaline, calcareous.

Reaction in the A horizon ranges from medium acid to mildly alkaline. The A horizon is 6 to 20 inches thick. The A1 horizon is black (10YR 2/1), very dark gray (10YR 3/1), or dark gray (10YR 4/1). It is less than 8 inches thick. The A2 horizon is gray (10YR 5/1), grayish brown (10YR 5/2), or light brownish gray (10YR 6/2) and has mottles in shades of gray, brown, and yellow. In some pedons this horizon is a mixture of these same colors.

The B2tg&A horizon is dark gray (10YR 4/1; N 4/0; 5Y 4/1), olive gray (5Y 4/2, 5/2), gray (10YR 5/1, 6/1; N 5/0, 6/0; 5Y 5/1, 6/1), dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2; 2.5Y 6/2) and has mottles in shades of gray, brown, or yellow. The Btg part of the horizon is fine sandy loam or sandy clay loam. Tongues of fine sand that are 1 to 2.5 inches wide, few to common, and 4 to 12 inches apart extend vertically from the A2 horizon. Most pedons have a few smaller tongues. Dark-colored organic stains occur on sand grains at the base of some tongues.

The B3&A horizon has color similar to that of the Btg&A horizon. It is loamy fine sand that has fine sand tongues of the A2 horizon. Some pedons have no B3&A horizon.

The IICg horizon is a mixture of gray or light gray fine sand mixed with white shell fragments. This horizon is at a depth of more than 24 inches and is moderately alkaline.

Winder soils are associated with Riviera, Chobee, Tequesta, Hallandale, and Pinellas soils. Unlike Riviera soils, they have a Btg&A horizon above a depth of 20 inches. They do not have the thick dark A1 horizon of Chobee soils. Winder soils do not have an organic Oa surface layer such as that in Tequesta soils. Unlike Hallandale soils, they have a loamy Btg&A horizon rather than limestone within a depth of 20 inches. They lack the A22ca horizon of Pinellas soils.

Wn—Winder fine sand. This is a nearly level, poorly drained soil that has a sandy subsurface layer that tongues into a loamy subsoil at a depth of less than 20 inches. This soil is on broad, low flats and in depressions and poorly defined drainageways. It has the pedon described as representative of the series. Under natural conditions, the water table is within 10 inches of the surface for 2 to 6 months during most years. Some areas are flooded for periods of a few days to about 3 months.

Included with this soil in mapping are small areas of Riviera, Chobee, and Tequesta soils; soils that have

few or no tongues from the subsurface layer in the subsoil; and soils in depressions that lack a dark colored surface layer.

The natural vegetation is maidencane, St. Johnswort, needlegrass, pickerelwood, southern bayberry, and scattered cypress trees. Most areas of this soil are in native vegetation.

If a water control system is installed, this soil is well suited to vegetables. In addition to drainage and irrigation, the growth of cover crops during fallow periods maintains organic-matter content and improves tilth. Fertilizer and lime should be applied according to crop needs. Capability unit IIIw–5.

Use and Management of the Soils

Palm Beach County Area is urbanizing rapidly. Land that was used a few years ago for commercial production of citrus, truck crops, other farm crops, and cattle has been recently converted to nonfarm use. Agricultural production in the Everglades, however, continues to grow.

In this section, the soils are rated for various engineering or nonfarm uses, their engineering properties are evaluated, and their suitability for farming, wildlife, and recreational development are discussed.

Crops and Pasture

Most soils in Palm Beach County Area are not suited to farming unless there is some water control. A natural or geographic division separates these soils into two broad groups: mineral or sandy soils in the eastern third of the county and organic or muck soils of the Everglades in the western part. Generally, the soils most used for crops and pasture in the sandlands are poorly drained and have a sand surface layer and a sandy or loamy subsoil that, in places, rests on limestone. All of the organic soils in the mucklands are used intensively for crops and pasture (fig. 6). In their natural condition, these soils are very poorly drained and are made up of well decomposed organic material that rests on limestone at varying depths. When these soils are drained or not completely saturated with water, the organic material subsides and oxidizes at the rate of about 1 inch per year.

In the sandland area, truck crops were grown on 34,790 acres in the 1973-1974 season. The major crops were beans, sweet corn, green peppers, and tomatoes. Citrus crops were produced on an estimated 20,000 acres. Production of cut flowers, bulbs, and ornamentals is also important in the sandlands.

In the muckland area, sugarcane is the major crop. In the 1973-1974 season, sugarcane was grown on more than 240,000 acres, which indicates about a 50 percent

Figure 6.—**Young sweet corn and mature sugarcane growing on Terra Ceia muck. These two crops are widely grown on this soil.**

increase in the last few years. About 80,000 acres in the Everglades are used for sweet corn, celery, radishes, leafy vegetables, and other truck crops.

About 180,000 acres throughout the county are used for pasture, primarily for beef cattle but also for dairy cattle. Pangolagrass and Bahiagrass are improved grasses, which are mostly used for sandland pasture. St. Augustine grass is used mostly for muckland pasture.

Sod is produced on about 13,000 acres. Formerly, this acreage was about equally divided between sandland and muckland, but now almost all sod is grown on organic soil.

Capability grouping

The capability grouping is based on the permanent limitations of soils if used for field crops, the risk of damage if these soils are farmed, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, horticultural crops, or other crops requiring special management.

The capability classification can be used to determine the behavior of soils when used for other purposes. This classification, however, is not a substitute for interpretations designed to show suitability and limitations of groups of soils for wildlife, for recreation, or for engineering.

In the capability system, soils are grouped at three levels: the class, the subclass, and the unit. The broadest grouping is the capability class and is designated by Roman numerals I to VIII. Soils in class I have the fewest limitations, the widest range of use, and the least risk of damage if used. The soils in the other classes have progressively greater natural limitations. For example, soils and land forms in class VIII are so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The capability subclass indicates major kinds of limitations within a class. Within most classes there are up to 4 subclasses. Subclasses are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage) ; *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c* indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w, s,* and *c,* because the soils are subject to little or no erosion but have other limitations that confine their use largely to pasture, range, or wildlife habitat.

Subclasses are further divided into groups called capability units. These are groups of soils that are so much alike that they are suited to the same crops and pasture plants, require about the same management, and have generally similar productivity and other response to management. Capability units are generally identified by numbers assigned locally, for example, IIIw–1 or VIs–1.

The eight classes in the capability system, the subclasses, and the units in Palm Beach County Area are described in the following list. The unit designation is given at the end of each mapping unit description.

The following mapping units are not assigned to a capability unit: Arents, very steep; Arents-Urban land complex; Arents-Urban land complex, organic substratum; Basinger-Urban land complex; Canaveral-Urban land complex; Cocoa-Urban land complex; Myakka-Urban land complex; Palm Beach-Urban land complex; Pits; Quartzipsamments, shaped; Riviera-Urban land complex; St. Lucie-Urban land complex; Udorthents; and Urban land. None of these units are used for crops.

Class I. Soils have few limitations that restrict their use (no subclasses). (None in Palm Beach County Area.)

Class II. Soils have moderate limitations that reduce the choice of plants or require moderate conservation practices. (None in Palm Beach County Area.)

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

- Subclass IIIw. Soils severely limited because of excess water.
  - Unit IIIw–1. Nearly level, somewhat poorly drained sandy soils 24 to 40 inches deep over an organic soil.
  - Unit IIIw–2. Nearly level, poorly drained soils that have a loamy subsoil underlain by fractured limestone at a depth of 24 to 40 inches.
  - Unit IIIw–3. Nearly level, poorly drained sandy soils that have a layer weakly cemented with organic matter within a depth of 40 inches.
  - Unit IIIw–4. Nearly level, poorly drained soils that have a sandy surface and subsurface layer 20 to 40 inches thick and a loamy subsoil.
  - Unit IIIw–5. Nearly level, poorly drained sandy soils that have a loamy subsoil within a depth of 20 inches.
  - Unit IIIw–6. Nearly level, very poorly drained loamy soils that have a thick, black surface layer.
  - Unit IIIw–7. Deep, nearly level, very poorly drained sandy soils that have a thick, black surface layer.
  - Unit IIIw–8. Nearly level, very poorly drained sandy soils that have a thick, black surface layer and a loamy subsoil 20 to 40 inches thick.
  - Unit IIIw–9. Nearly level, very poorly drained sandy soils that have a black muck surface layer 6 to 16 inches thick and a loamy subsoil.

Unit IIIw–10. Deep, nearly level, very poorly drained sandy soils that have a black muck surface layer 8 to 16 inches thick.

Unit IIIw–11. Nearly level, very poorly drained organic soils that have organic layers 16 to 40 inches thick underlain by sandy mineral material.

Unit IIIw–12. Nearly level, very poorly drained organic soils that have an organic layer 20 to 51 inches thick underlain by hard limestone.

Unit IIIw–13. Nearly level, very poorly drained organic soils that have an organic layer more than 51 inches thick.

Unit IIIw–14. Deep, nearly level, very poorly drained organic soils that have a high content of fine textured mineral material.

Class IV. Soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Subclass IVw. Soils very severely limited because of excess water.

Unit IVw–1. Deep, nearly level, poorly drained sandy soils.

Unit IVw–2. Nearly level, poorly drained, sandy soils that have a loamy subsoil layer at a depth of 40 to 60 inches. Some have a layer that is weakly cemented with organic matter above the loamy subsoil.

Unit IVw–3. Deep, nearly level, poorly drained sandy soils that have a layer weakly cemented with organic matter within a depth of 45 inches.

Unit IVw–4. Nearly level, poorly drained sandy soils that are underlain by limestone at a depth of less than 20 inches.

Class V. Soils are not likely to erode but have other limitations that are impractical to remove and that limit their use largely to pasture, range, woodland, or wildlife habitat.

Subclass Vw. Soils too wet for cultivation; drainage or protection not feasible.

Unit Vw–1. Nearly level, very poorly drained organic soils underlain by limestone within a depth of 20 inches.

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and that limit their use largely to pasture, range, woodland, or wildlife habitat.

Subclass VIs. Soils severely limited because of droughtiness.

Unit VIs–1. Deep, nearly level to sloping, excessively drained soils that are sandy throughout.

Unit VIs–2. Deep, nearly level to gently sloping, moderately well drained sandy soils that have a layer weakly cemented with organic matter at a depth of 30 inches or more.

Class VII. Soils have very severe limitations that make them generally unsuited to cultivation and that restrict their use largely to range, woodland, or wildlife habitat.

Subclass VIIs. Soils very severely limited because of droughtiness.

Unit VIIs–1. Deep, nearly level to sloping, excessively drained soils that are sandy throughout.

Subclass VIIw. Soils very severely limited because of wetness.

Unit VIIw–1. Nearly level, very poorly drained sandy soils. Some have a loamy subsoil and others have a layer weakly cemented with organic matter. They are covered with shallow water much of the time.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, water supply, or to esthetic purposes.

Subclass VIIIw. Soils very severely limited because of wetness.

Unit VIIIw–1. Nearly level or gently sloping sandy and shell soil along the shoreline that is flooded daily by high tide.

Unit VIIIw–2. Nearly level areas along the coast that are covered by brackish water or daily high tides.

Estimated yields

Table 3 lists estimated average yields per acre of the principal crops in Palm Beach County Area. These estimated yields are those that can be expected under high level management practices. In areas used for crops and groves, these practices include applying adequate amount of fertilizer and lime, controlling insects, properly managing crop residue, supplying drainage or water control if needed, and installing properly designed irrigation systems. Management practices in areas used for improved pasture include applying adequate amounts of fertilizer and lime, controlling grazing, rotating pasture, selecting forage varieties best adapted to the soils involved, controlling undesirable plants, providing drainage to remove excess surface water, and installing irrigation systems if feasible and needed.

The yields in table 3 are based largely on information obtained from interviews with farmers, from observations by members of the soil survey party, from records and experience of the district conservationist and County Extension Director, from bulletins and other information compiled by the University of Florida Agricultural Experiment Stations, from comparisons of yields on similar soils in other counties in South Florida, and from records of crop yields kept by the Florida Crop Reporting Service. The yield estimates assume optimum weather conditions.

Arents, very steep; Beaches; Pits; Quartzipsamments, shaped; Udorthents; Urban land; and the Urban land complexes are not placed in this table because they are not used for crops and pasture.

TABLE 3.—*Yields per acre of crops and pasture*

[All yields were estimated for a high level of management in 1974. Absence of a yield figure indicates the crop is seldom grown or is not suited. Only arable soils are listed]

Soil name and map symbol	Sugarcane	Corn, sweet	Celery	Tomatoes	Peppers	Bahiagrass	Grass-clover
	Ton	*Ton*	*Crate*	*Ton*	*Bu*	*AUM* [1]	*AUM* [1]
Anclote: An		4.5		6	450	10.0	13.0
Basinger: Ba		4.0		13		8.0	12.0
Boca: Bo		3.8		16	800	8.0	
Chobee: Ch				6		12.0	15.0
Dania: Da						15.0	
Floridana: Fa		3.5		14	800	10.0	13.0
Hallandale: Ha				16		5.5	
Holopaw: Ho		3.5		8		8.0	10.0
Immokalee: Im				15		9.0	12.0
Jupiter: Ju				16		5.5	
Lauderhill: La	40	4.5	800			15.0	
Myakka: Mk				15		9.0	12.0
Okeechobee: Oc	40	4.5	800			15.0	
Okeelanta: On	35	4.5	800			15.0	
Oldsmar: Os		3.0		8	750	9.0	12.0
Pahokee: Pa	40	4.5	800			15.0	
Paola: PcB						4.5	
Pineda: Pd		2.5		7		10.0	12.0
Pinellas: Pe		2.5		7		10.0	12.0
Placid: Pg		4.5		6	450	10.0	13.0
Pomello: PhB						3.5	
Pompano: Po		4		13		8.0	12.0
Riviera: Ra		2.5		7		10.0	12.0
Sanibel: Sa		3.5		6	800	15.0	
Tequesta: Ta		3.5		6	800	15.0	
Terra Ceia: Tc	40	4.5	800			15.0	
Torry: Tr	50	5	825			15.0	
Wabasso: Wa		2.5		13		9.0	12.0
Winder: Wn				8		9.0	12.0

[1] Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

Wildlife [2]

Wildlife is a valuable resource of Palm Beach County Area. Although urban expansion is rapid in the coastal area, large areas in other parts of the survey area remain undeveloped and support a large number of wildlife species.

White-tailed deer and wild turkeys make their home almost exclusively in large, undeveloped areas. Wild turkeys are few and live mainly in mineral soil areas. Deer are numerous and find suitable habitat on the sandlands and the mucklands of the Everglades. Quail and dove live mainly in the eastern sandland area where suitable habitat exists on all but the wettest soils.

Numerous other game and nongame species of wildlife thrive in the survey area. Raccoons are numerous and find suitable habitat in all parts of the survey area, especially in wooded areas. They feed on berries, small reptiles and amphibians, shell fish, crustaceans, vegetable crops, and citrus.

Gray squirrels are few, and they live mainly in heavily wooded flatwoods, swamps, and wooded areas near ponds.

[2] JOHN F. VANCE, JR., biologist, Soil Conservation Service, helped prepare this section.

Rabbits and armadillos frequent parts of the survey area, though few armadillos live in the mucklands. Bobcats are not uncommon. They generally live in swamps and wooded areas that provide needed protection.

Alligators are common in Palm Beach County Area. They live mostly in the muckland of the Everglades, but also live in swamps, canals, and depressions. Otter are also fairly common and have the same habitat and population distribution as the alligator.

Florida mallards are resident wild ducks. They inhabit open water in very poorly drained areas throughout the survey area. Ringnecks, pintail, mallard, wigeon, teal, and other migratory wild ducks also inhabit these areas in the fall and winter.

Large sandhill cranes are not numerous. They feed in open flatwoods and slough areas and nest in shallow water areas. Although cattle egrets are not native to the survey area, they are numerous, feed on insects stirred up by grazing cattle, and nest in trees in swamps and in thickets near ponds.

Snowy egrets, white and wood ibis, limpkins, great blue and little blue herons, and other wading birds are abundant in the wet, mineral and organic soil areas. These birds feed on snails, small fish, frogs, and insects in shallow water areas and adjacent sloughs. They nest in bushes and trees over water.

Many saltwater game fish live in the coastal waters. The most common freshwater game fish are black crappie, speckled perch, large mouth black bass, shellcrackers, channel catfish, and bluegill bream. Most perch and shellcrackers are in Lake Okeechobee. Bass and bream live in the lakes and canals of the interior and provide fair to good fishing. Excavated ponds can be established almost anywhere in soils that have a relatively stable high water table. Ponds one half acre or more in size that are properly stocked and managed provide good fishing; stocking of such ponds with channel catfish is increasing.

Successful management of wildlife on any tract of land requires that food, cover, and water be available in a suitable combination. The lack of any one of these requirements results in an unfavorable balance or an inadequate distribution of desirable wildlife species.

Most wildlife habitats are managed by planting suitable vegetation, manipulating existing vegetation to bring about a favorable habitat, or a combination of these measures. Water areas can be created and natural ones improved for wildlife habitat. The influence of a soil on the growth of many plants is known, and for other plants the soil influence can be inferred from a knowledge of the characteristics and behavior of the soil.

Soil interpretations for wildlife habitat serve as an aid in selecting the more suitable sites for various kinds of habitat management. They serve as indicators of the level of management needed to achieve satisfactory results and as a means of showing why it may not be feasible to manage a particular area for a given kind of wildlife. They also serve in a broad-scale planning of wildlife management areas.

Wildlife habitat can be created, improved, or maintained by planting or managing existing vegetation on the soils to provide desirable plants. In table 4 the soils are rated for their suitability for producing seven kinds of wildlife habitat elements and three general kinds of wildlife. The present land use, the relationship of soils to adjoining areas, and the movement of wildlife are not considered in these ratings. The size, shape, or location of the areas does not affect the rating. Certain influences on habitat must be appraised by onsite investigation. The level of suitability ratings in table 4 are defined as follows:

Good: Habitats are easily improved, maintained, or created. There are few or no soil limitations in habitat management, and satisfactory results can be expected.

Fair: Habitats can be improved, maintained or created on these soils, but moderate soil limitations affect habitat management or development. A moderate intensity of management and fairly frequent attention may be required to ensure satisfactory results.

Poor: Habitats can be improved, maintained, or created on these soils, but the soil limitations are severe. Habitat management may be difficult and expensive and require intensive effort. Results are questionable.

Very poor: Under the prevailing soil conditions, it is not practical to attempt to improve, maintain, or create habitats. Unsatisfactory results are probable.

The seven wildlife habitat elements in table 4 are discussed in the following paragraphs:

Grain and seed crops are domestic and seed producing annual plants that provide food for wildlife. Examples are corn, oats, millet, cowpeas, rye, sorghum, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that provide wildlife cover and food. Examples are bahiagrass, pangolagrass, combine peas, white clover, lespedeza, and hairy indigo.

Wild herbaceous plants are native or naturally established grasses and forbs (including weeds) that provide food and cover for wildlife. These plants are established mainly through natural processes. Examples are beggarweed, partridge pea, pokeweed, carpetgrass, pokeberry, ragweed, lespedeza, and Aeschynomene americana or deer-vetch.

Hardwood trees and shrubs include nonconiferous trees and associated woody understory plants that provide wildlife cover or that produce nuts, buds, catkins, twigs, bark, or foliage used as food by wildlife. Examples are oak, hickory, maple, sweetgum, dogwood, cabbage palm, blueberry, briars, grape, and honeysuckle.

Coniferous plants are cone-bearing trees, shrubs, or groundcover that provide wildlife cover or supply food in the form of browse, seeds, or fruit-like cones. They are established mainly through natural processes, but may be planted. Examples are pines and cedars.

Wetland plants are annual and perennial wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics. Wetland plants provide food or cover used extensively by wetland wildlife. Examples are cattail, cutgrass, wild millet, smartweed, sedges, and rushes.

Shallow water areas are areas of surface water with an average depth of less than 5 feet. These areas are useful to wildlife. They may be natural wet areas or those created by dams, dikes, or levees used for controlling the water in marshy areas. In places they are designed so that these areas can be drained or flooded.

The three general kinds of wildlife in table 4 are described in the following paragraphs:

Openland wildlife generally inhabits croplands, pastures, groves, lawns, and areas overgrown with grasses, herbs, shrubs, and vines. Openland wildlife includes quail, doves, cottontail rabbits, meadowlarks, and field sparrows.

Woodland wildlife generally inhabits wooded areas that have either hardwood trees, coniferous trees and shrubs, or a mixture of both. Woodland wildlife includes deer, wild turkeys, squirrels, raccoons, and woodpeckers.

Wetland wildlife generally inhabits such wet areas as ponds, ditches, marshes, and swamps. Wetland wildlife includes ducks, geese, shore birds, herons, otter, and alligators.

Engineering

This section is useful to those who need information about soils used as structural material or as foundations upon which structures are built. Among those

TABLE 4.—*Wildlife habitat potentials*

[See text for definitions of "good," "fair," "poor," and "very poor." There are no ratings for Beaches (Bn), Pits (Pf), Urban land (Ur), or Urban land part of AU, AX, Bc, Cc, CuB, Mu, PbB, Ru, or SuB]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Adamsville variant: AdB	Poor	Poor	Poor	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Anclote: An	Very poor.	Poor	Poor	Fair	Poor	Good	Good	Poor	Fair	Good.
Arents, very steep: ASF	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Arents: AU	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Arents, organic substratum: AX.	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Basinger:										
Ba, Bc	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
BM:										
Basinger part	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Myakka part	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
Boca: Bo	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
Canaveral: Cc	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Chobee: Ch	Poor	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.
Cocoa: CuB	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Dania: Da	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Floridana: Fa	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Hallandale: Ha	Poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Fair.
Holopaw: Ho	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
Immokalee: Im	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
Jupiter: Ju	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.
Lauderhill: La	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Myakka: Mk, Mu	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
Okeechobee: Oc	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Okeelanta: On	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Oldsmar: Os	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
Pahokee: Pa	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Palm Beach: PbB	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Paola: PcB	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Pineda: Pd	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
Pinellas: Pe	Very poor.	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
Placid: Pg	Poor	Fair	Fair	Poor	Fair	Good	Good	Fair	Fair	Good.
Pomello: PhB	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Pompano: Po	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
Quartzipsamments, shaped: QAB.	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Riviera:										
Ra, Ru	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair.
Rd	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Sanibel: Sa	Very poor.	Poor	Poor	Very poor.	Very poor.	Good	Good	Poor	Very poor.	Good.
St. Lucie: ScB, SuB	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Tequesta: Ta	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Terra Ceia: Tc	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Tidal swamp, mineral: TM	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Fair.

TABLE 4.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Tidal swamp, organic: TO	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Fair.
Torry: Tr	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Udorthents: UD	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Wabasso: Wa	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
Winder: Wn	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.

who can use this information are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, shear strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, soil reaction, depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

The information in this survey can be used to:

1. Make soil and land use studies that will aid in selecting and developing industrial, commercial, residential, and recreational areas.
2. Plan the construction of drainage and irrigation systems, ponds, and other soil and water conservation structures.
3. Make preliminary evaluations of soils in selecting locations for highways, airports, pipelines, cables, and buildings, and in planning more detailed investigations at the selected location.
4. Locate sources of sand, topsoil, and other construction material.
5. Correlate performance of engineering structures with soil mapping units and thus develop information that will be useful in designing and maintaining structures.
6. Determine the suitability of soil mapping units for cross country movement of vehicles and construction equipment.
7. Supplement other publications, such as maps, reports, and aerial photographs that are used to prepare engineering reports for a specific area.

The engineering interpretations reported here can be used for many purposes, but they do not eliminate the need for sampling and testing soils at the site of a specific engineering work. The soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Some terms used by soil scientists have a special meaning in soil science. These terms are defined in the Glossary.

Engineering classification systems

The two systems of soil classification in general use by engineers are the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) *(1)*, and the Unified system *(2)* developed by the Waterways Experiment Station, Corps of Engineers, and now used by the U.S. Department of Defense and by the Soil Conservation Service.

The AASHTO system is used to classify soils according to those properties that affect use in highway maintenance. In this system, a soil is placed in one of seven basic groups ranging from A–1 to A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength if wet and that are the poorest soils for subgrade. If laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest.

The AASHTO classification for tested soils, with group index numbers in parentheses, is shown in Table 5; the estimated classification, without group index numbers, is given in Table 6 for all soils mapped in the survey area.

In the Unified system, soils are classified as coarse grained, fine grained, or organic, according to particle-size distribution, plasticity, liquid limit, and organic-matter content.

There are eight classes of coarse-grained soils, each consisting of soils in which more than half the particles are larger than 0.074 millimeter. These classes are

designated by G for gravel and S for sand, combined with W for well graded, P for poorly graded, M for silty, or C for clayey.

There are six classes of fine-grained soils, each consisting of soils in which more than half the particles are smaller than 0.074 millimeter. These classes are designated by M for silts, C for clays, and O for organic soils, combined with L for low liquid limit or H for high liquid limit.

Highly organic, or peaty, soils are designated by the symbol Pt.

Table 5 shows the AASHTO and Unified classifications of specified soils in the county, as determined by laboratory tests, and table 6 shows the estimated classification of all the soils in the county.

Engineering test data

Table 5 contains engineering test data made by the Soils Laboratory, Florida Department of Transportation, Bureau of Materials and Research, on some of the major soil series in Palm Beach County Area. These tests were made to evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analysis and by tests that determine liquid limits and plastic limit.

The mechanical analyses were made by combined sieve and hydrometer methods. In this method the various grain-size fractions are calculated on the basis of all material in the soil sample, including those particles that are coarser than 2 millimeters in diameter. The mechanical analyses used in this method should not be used in naming textural classes of soils.

Compaction (or moisture density) data are important in earthwork. If a soil material is compacted at a successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. After that, density decreases with the increase in moisture content. The highest dry density obtained in the compactive test is termed *maximum dry density*. As a rule, the maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Liquid limit and plasticity index indicate the effect of water on the strength and consistency of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from semisolid to plastic. If the moisture content is further increased, the material changes from plastic to liquid. The plastic limit is the moisture content at which the soil material changes from semisolid to plastic, and the liquid limit is the moisture content at which the soil material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. The data on liquid limit and plasticity index in this table are based on laboratory tests of soil samples.

Classifications and physical properties significant in engineering

Classifications and physical properties of the soils significant in engineering are given in table 6. These estimates are made for typical soil pedons, by layers sufficiently different to have different significances for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soils in other areas.

Following are explanations of some of the columns in table 6.

Soil texture is described in table 6 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that has particles less than 2 millimeters in diameter. Sandy clay loam, for example, is soil material that is 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand. Texture is estimated on the basis of field examination and laboratory data. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary. Also listed in table 6 are the Unified and the AASHTO classifications.

The columns showing the percent of soil material passing the number 4, 10, 40, and 200 sieves indicate estimated minimum and maximum amounts of each significant layer of the soil profile that will pass these sieves.

Liquid limit and plasticity index are also estimated in this table. Explanations of liquid limit and plasticity index are given in the paragraph explaining the columns in table 5, in the section "Engineering test data."

Physical and chemical properties of soils significant in engineering

Table 7 shows estimated values for several soil characteristics and features that affect the behavior of soils in engineering use. These estimates are given for each major horizon, at the depths indicated, in the representative pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships between the soil characteristics, observed in the field, that influence the downward movement of water in the soil, particularly soil structure; porosity; and gradation or texture. The estimates are for water moving vertically when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the planning and design of drainage systems, in the evaluation of the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are organic-matter content, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the

TABLE 5.—*Engineering*

[Tests performed by the Florida State Department of Transportation (FDOT) in cooperation with the U.S. Bureau of Public Schools

Soil name and location	FDOT report No.	Depth	Moisture density [1]	
			Maximum dry density	Optimum moisture content
		In	*Lb/Cu ft*	*Pct*
Anclote fine sand:				
About ½ mile south of Donald Ross Road and ¼ mile west of Prosperity Farms Road; NW1/4SW1/4 sec. 5, T. 41 S., R. 43 E.	69	0–17	97.8	14.7
	71	17–62	101.1	13.9
Basinger fine sand:				
About 0.3 mile east of I-95 and ½ mile north of Blue Heron Blvd., 100 feet west of paved road, center of eastern half of NW1/2 sec. 30, T. 42 S., R. 43 E.	33	3–25	101.6	14.8
	34	44–54	108.1	13.2
Chobee fine sandy loam:				
About 4 miles north of State Road 80 and 0.5 mile east of Royal Palm Beach Blvd., SE1/4SE1/4 sec. 11, T. 43 S., R. 41 E.	52	4–16	107.4	15.9
	53	16–26	111.7	14.7
	54	26–32	119.1	12.6
Holopaw fine sand:				
About 1 mile northeast of L-8 and about 1.8 miles south of Corbett Wildlife Preserve boundary; SE1/4NE1/4 sec. 25, T. 42 S., R. 39 E.	57	4–42	103.0	13.3
	58	42–47	114.8	12.1
Immokalee fine sand:				
About ¼ mile northeast of the Boca Raton Airport office, 75 feet north of paved road; NW1/4SW1/4 sec. 7, T. 47 S., R. 43 E.	42	18–37	101.0	15.2
	43	45–58	105.6	13.3
Myakka sand:				
About 100 feet north of 10th Avenue North, and ¼ mile east of Jog Road; NE1/4NE1/4 sec. 22, T. 44 S., R. 42 E.	1	7–26	104.1	14.1
	2	26–36	101.3	14.6
	3	47–72	107.5	10.8
Oldsmar sand:				
About 0.2 mile north of Lantana Road and 0.2 mile west of the Sunshine State Parkway; SE1/4SE1/4 sec. 32, T. 44 S., R. 42 E.	59	13–26	103.8	13.6
	60	34–42	106.7	12.7
	61	42–46	115.3	14.0
Paola sand:				
About ½ mile west of U.S. Hwy. 1 on Donald Ross Road R/w, north side; SW1/4SW1/4 sec. 21, T. 41 S., R. 43 E.	45	4–21	100.2	15.6
	46	37–80	103.8	14.4
Pineda sand:				
About ⅛ mile south of Forest Hill Blvd.; 2100 feet east of Sunshine State Parkway; NE1/4NW1/4 sec. 16, T. 44 S., R. 42 E.	8	3–19	104.7	12.6
	9	19–34	102.0	13.2
	10	34–44	115.6	12.4
Placid fine sand:				
About 0.2 mile east of Military Trail, ⅜ mile north of Clint Moore Road; NW1/4SW1/4 sec. 36, T. 47 S., R. 43 E.	40	23–60	101.0	16.3
Pomello fine sand:				
About 500 feet west of Perry Avenue and about 1000 feet north of Tony Penna Road in Jupiter; SE1/4SW1/4 sec. 1, T. 41 S., R. 42 E.	48	4–44	96.8	17.2
Pompano fine sand:				
About 100 feet east of El Rio Canal, about 0.45 mile north of entrance road to Florida Atlantic University; NW1/4NE1/4 sec. 18, T. 47 S., R. 43 E.	35	8–32	101.0	15.8
	36	32–52	102.4	14.6
Riviera sand:				
About 0.2 mile east of Blanchette Trail and 0.3 mile south of Forest Hill Blvd., SW1/4NE1/4 sec. 17, T. 44 S., R. 42 E.	4	6–28	103.7	12.6
	5	36–42	114.1	13.3
Sanibel muck:				
About 0.6 mile east of Military Trail and 0.3 mile north of Clint Moore Road; NW1/4SE1/4 sec. 36, T. 46 S., R. 42 E.	41	6–60	101.5	15.3
St. Lucie sand:				
About 0.2 mile east of Congress Avenue and 0.2 mile south of Lantana Road; SE1/4NW1/4 sec. 5, T. 45 S., R. 43 E.	44	5–80	100.9	14.5

test data

in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO) (*1*)]

Mechanical analysis [2]						Liquid limit	Plasticity index	Classification	
Percentage passing sieve—			Percentage smaller than—					AASHTO [3]	Unified [4]
No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.002 mm				
						Pct			
100	87	7	6	3	1	------------	[5] NP	A-3(0)	SP-SM
100	87	2	2	2	0	------------	NP	A-3(0)	SP
100	89	2	1	0	0	------------	NP	A-3(0)	SP
100	91	5	5	2	1	------------	NP	A-3(0)	SP-SM
100	93	16	13	8	5	------------	NP	A-2-4(0)	SM
100	93	18	15	12	9	------------	NP	A-2-4(0)	SM
100	68	25	24	21	12	------------	NP	A-2-4(0)	SM
100	95	1	0	0	0	------------	NP	A-3(0)	SP
100	96	19	17	15	14	------------	NP	A-2-4(0)	SM
100	88	2	1	0	0	------------	NP	A-3(0)	SP
100	89	7	5	1	0	------------	NP	A-3(0)	SP-SM
100	90	2	1	0	0	------------	NP	A-3(0)	SP
100	92	7	5	3	3	------------	NP	A-3(0)	SP-SM
100	90	5	5	3	2	------------	NP	A-3(0)	SP-SM
100	90	2	2	2	1	------------	NP	A-3(0)	SP
100	90	6	4	3	1	------------	NP	A-3(0)	SP-SM
100	91	17	16	15	13	------------	NP	A-2-4(0)	SM
100	85	1	0	0	0	------------	NP	A-3(0)	SP
100	81	2	1	0	0	------------	NP	A-3(0)	SP
100	86	2	2	2	0	------------	NP	A-3(0)	SP
100	86	1	1	1	0	------------	NP	A-3(0)	SP
100	85	15	13	12	3	------------	NP	A-2-4(0)	SM
100	92	1	0	0	0	------------	NP	A-3(0)	SP
100	96	3	1	0	0	------------	NP	A-3(0)	SP
100	94	1	1	0	0	------------	NP	A-3(0)	SP
100	94	2	2	0	0	------------	NP	A-3(0)	SP
100	88	1	1	0	0	------------	NP	A-3(0)	SP
100	90	10	16	14	14	------------	NP	A-2-4(0)	SM
100	81	1	0	0	0	------------	NP	A-3(0)	SP
100	87	1	0	0	0	------------	NP	A-3(0)	SP

TABLE 5.—*Engineering*

Soil name and location	FDOT report No.	Depth	Moisture density [1]	
			Maximum dry density	Optimum moisture content
		In	*Lb/Cu ft*	*Pct*
Wabasso fine sand:				
About 100 feet east of Main Road, 3 miles north of Okeechobee Road; SE1/4 SW1/4 sec. 2, T. 43 S., R. 41 E.	37	22–32	105.5	12.9
	38	32–38	109.7	14.3
Winder fine sand:				
About 100 feet south of P. G. A. Road and ¼ mile west of C–18; NE1/4NW1/4 sec. 8, T. 42 S., R. 42 E.	39	16–24	114.1	12.8

[1] Based on AASHTO Designation T99–70(*1*).
[2] Mechanical analysis according to AASHTO Designation T88–70(*1*). Results by this procedure differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field checks. For many soils the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops and ornamental or other plants to be grown, in evaluating soil amendments for fertility and stabilization, and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25° C. Estimates are based on field and laboratory measurements at representative sites on nonirrigated soils. The salinity of individual irrigated fields is largely affected by the quality of the irrigation water and the irrigation practices. Hence, the salinity of individual fields can differ greatly from the value given in table 7. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others shrink-swell potential was estimated on the basis of the kind of clay in the soil and on measurements of similar soils. The size of imposed loadings and the magnitude of changes in soil moisture content are also important factors that influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A *high* shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion, as used in table 7, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, partical-size distribution, total acidity, and electrical conductivity of the soil material. The rating of soils for corrosivity to concrete is based mainly on the sulfate content, soil texture, and acidity. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from corrosion. Installations of steel that intersect soil boundaries of soil horizons are more susceptible to corrosion than installations entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation

test data—Continued

Mechanical analysis [2]						Liquid limit	Plasticity index	Classification	
Percentage passing sieve—			Percentage smaller than—					AASHTO [3]	Unified [4]
No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.002 mm				
						Pct			
100	92	5	4	1	1	----------	NP	A-3(0)	SP-SM
100	92	22	21	18	11	27	9	A-2-4(0)	SC
100	95	17	16	14	13	----------	NP	A-2-4(0)	SM

[3] Based on AASHTO Designation M 145-66(*1*).
[4] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of A-line are to be given a borderline classification. An example of borderline classification is SP-SM.
[5] Nonplastic.

is difficult to establish. They are generally not suitable for crops.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

Wind erodibility groups 4 through 8 do not occur in Palm Beach County Area.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 8 the degree of soil limitation and the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the rated use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for this use have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

TABLE 6.—*Engineering properties and classifications*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil that may have different properties and limitations. It is necessary, therefore, to follow carefully the instructions for referring to other series that appear in the first column. The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Adamsville variant: AdB.	0-36	Sand----------	SP, SP-SM	A-3	0	100	100	80-95	2-10	--------	NP
	36-65	Muck, sapric material.	Pt, OH	A-7	0	100	100	95-100	70-100	60-100	30-50

TABLE 6.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Anclote: An	0–17	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	95–100	85–100	2–12	----	NP
	17–62	Fine sand	SP, SM, SP-SM	A-3, A-2-4	0	100	95–100	85–100	2–20	----	NP
Arents, very steep: ASF.	0–80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	95–100	75–95	60–90	2–12	----	NP
Arents: AU. No ratings for Urban land part.	0–60	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80–95	2–10	----	NP
Arents, organic substratum: AX. No ratings for Urban land part.	0–39	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80–95	2–10	----	NP
	39–72	Muck, sapric material.	Pt	----	0	----	----	----	----	----	----
	72–80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80–95	2–10	----	NP
*Basinger:											
Ba	0–72	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85–100	2–12	----	NP
Bc. No ratings for Urban land part.	0–72	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	90–100	2–12	----	NP
BM. For Myakka part, see Myakka series.	0–72	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	90–100	2–12	----	NP
Beaches: Bn	0–60	Sand, fine sand	SP, SW	A-3, A-1-b	0–5	60–80	50–75	40–70	1–5	----	NP
Boca: Bo	0–5	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80–99	2–12	----	NP
	5–29	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80–99	2–12	----	NP
	29–34	Sandy loam, sandy clay loam.	SC	A-2-4, A-6	0	100	100	80–99	25–40	20–40	11–20
	34–36	Variable	----	----	0	----	----	----	----	----	----
	36	Unweathered bedrock.									
Canaveral: Cc. No ratings for Urban land part.	0–8	Fine sand, sand, coarse sand.	SP	A-3	0	100	100	90–100	1–4	----	NP
	8–65	Fine sand, sand, coarse sand.	SP	A-3	0	70–100	70–95	65–90	1–3	----	NP
Chobee: Ch	0–26	Fine sandy loam.	SM, SM-SC	A-2-4	0	100	100	85–99	12–25	<40	NP-10
	26–37	Sandy clay loam.	SM, SM-SC	A-2-4	0	100	100	65–99	25–35	<40	NP-10
	37–40	Loamy sand, loamy fine sand, fine sandy loam.	SM, SM-SC	A-2-4	0	100	100	80–99	12–25	<40	NP-10
Cocoa: CuB. No ratings for Urban land part.	0–22	Sand	SP, SP-SM, SM	A-3, A-2-4	0	100	100	70–90	4–15	----	NP
	22–30	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2-4	0	100	100	80–90	10–25	----	NP
	30	Weathered bedrock.									

TABLE 6.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Dania: Da	0–16	Muck, sapric material.	Pt	----------	0	--------	--------	--------	--------	--------	--------
	16–18	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	95–100	80–95	2–15	<25	NP-3
	18	Unweathered bedrock.									
Floridana: Fa	0–18	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80–90	5–15	--------	NP
	18–32	Fine sand	SP, SP-SM	A-3	0	100	100	80–90	2–10	--------	NP
	32–44	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85–95	20–35	20–30	5–20
	44–65	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80–95	2–15	<25	NP-3
Hallandale: Ha	0–6	Sand	SP, SP-SM	A-3	0	100	100	90–100	2–6	--------	NP
	6–15	Sand	SP, SP-SM	A-3	0	100	100	90–100	2–6	--------	NP
	15	Weathered bedrock.									
Holopaw: Ho	0–42	Fine sand	SP, SP-SM	A-3	0	100	95–100	70–95	1–10	--------	NP
	42–49	Sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	95–100	70–99	15–30	<25	NP-7
	49–60	Fine sand, loamy fine sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	95–100	80–99	2–15	<25	NP-3
Immokalee: Im	0–4	Fine sand	SP, SP-SM	A-3	10	100	100	85–100	2–10	--------	NP
	4–37	Fine sand	SP, SP-SM	A-3	10	100	100	85–100	2–10	--------	NP
	37–79	Fine sand	SP-SM, SM	A-3, A-2-4	10	100	100	85–100	5–21	--------	NP
	79–80	Fine sand	SP, SP-SM	A-3	10	100	100	85–100	2–10	--------	NP
Jupiter: Ju	0–11	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85–95	5–12	--------	NP
	11–14	Fine sand	SP	A-3	0	100	100	85–95	2–5	--------	NP
	14	Weathered bedrock.									
Lauderhill: La	0–26	Muck, sapric material.	Pt	----------	0	--------	--------	--------	--------	--------	--------
	26	Unweathered bedrock.									
Myakka: Mk, Mu. No ratings for Urban land part of Mu.	0–26	Sand	SP, SP-SM	A-3	0	100	100	85–100	2–10	--------	NP
	26–47	Sand	SM, SP-SM	A-3, A-2-4	0	100	100	85–100	5–20	--------	NP
	47–72	Sand	SP, SP-SM	A-3	0	100	100	85–100	2–8	--------	NP
Okeechobee: Oc	0–28	Muck, sapric material.	Pt	----------	0	--------	--------	--------	--------	--------	--------
	28–50	Mucky peat, hemic material.	Pt	----------	0	--------	--------	--------	--------	--------	--------
	50–66	Muck, sapric material.	Pt	----------	0	--------	--------	--------	--------	--------	--------
Okeelanta: On	0–31	Muck, sapric material.	Pt	A-8	0	--------	--------	--------	--------	--------	--------
	31–65	Fine sand, sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	85–100	80–95	2–15	--------	NP
Oldsmar: Os	0–34	Sand	SP, SP-SM	A-3	0	100	100	80–95	2–10	--------	NP
	34–42	Sand	SM, SP-SM	A-2-4, A-3	0	100	100	80–95	5–20	--------	NP

TABLE 6.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
	42–46	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	85–95	15–35	<35	NP-10
	46–50	Sand, loamy sand.	SP, SM, SP-SM	A-2-4, A-3	0	100	100	85–95	2–15	---	NP
Pahokee: Pa	0–42	Muck, sapric material.	Pt	---	0	---	---	---	---	---	---
	42	Unweathered bedrock.									
Palm Beach: PbB. No ratings for Urban land part.	0–80	Sand	SP, SW	A-3, A-1	0	100	75–95	15–90	1–5	---	NP
Paola: PcB	0–21	Sand	SP	A-3	0	100	100	85–100	1–2	---	NP
	21–80	Sand	SP	A-3	0	100	100	80–100	1–4	---	NP
Pineda: Pd	0–34	Sand	SP	A-3	0	100	100	80–95	1–5	---	NP
	34–44	Sandy loam, sandy clay loam.	SC, SM, SM-SC	A-2-4, A-2-6	0	100	100	80–95	15–35	<30	NP-15
	44–62	Sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80–95	5–15	---	NP
Pinellas: Pe	0–10	Fine sand	SP	A-3	0	100	100	90–100	2–5	---	NP
	10–36	Fine sand	SP-SM	A-3, A-2-4	0	100	100	90–100	5–12	---	NP
	36–54	Fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-1	0	100	100	90–100	12–35	20–30	5–13
	54–60	Fine sand	SP	A-3	0–5	80–100	75–100	60–95	2–5	---	NP
Pits: Pf. No ratings.											
Placid: Pg	0–17	Fine sand	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90–100	1–20	---	NP
	17–60	Fine sand	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90–100	1–20	---	NP
Pomello: PhB	0–44	Fine sand	SP, SP-SM	A-3	0	100	100	60–100	1–8	---	NP
	44–60	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	60–100	6–15	---	NP
	60–80	Fine sand	SP, SP-SM	A-3	0	100	100	60–100	4–10	---	NP
Pompano: Po	0–80	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	75–100	1–12	---	NP
Quartzipsamments, shaped: QAB.	0–80	Sand	SP, SP-SM	A-3	0	100	100	80–90	2–10	---	NP
Riviera: Ra, Rd, Ru. No ratings for Urban land part of Ru.	0–28	Sand	SP, SP-SM	A-3, A-2-4	0	100	100	80–100	1–12	---	NP
	28–36	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80–100	15–35	<35	NP-10
	36–42	Sandy loam, sandy clay loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	80–100	15–35	<35	NP-10
	42–62	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1	0	60–80	50–75	40–70	3–10	---	NP
Sanibel: Sa	12–0	Muck, sapric material.	Pt	---	0	---	---	---	---	---	---
	0–60	Sand	SP, SP-SM	A-3	0	100	100	80–95	1–10	---	NP

TABLE 6.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
St. Lucie: ScB, SuB. No ratings for Urban land part of SuB.	0–80	Sand	SP	A-3	0	100	100	85–99	1–5	---	NP
Tequesta: Ta	12–0	Muck, sapric material.	Pt	---	0	---	---	---	---	---	---
	0–32	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80–100	2–12	---	NP
	32–60	Fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80–100	15–35	<35	NP–10
	60–70	Fine sand, loamy fine sand.	SP, SP-SM	A-3, A-2-4	0	60–100	50–100	40–80	3–20	---	NP
Terra Ceia: Tc	0–65	Muck, sapric material.	Pt	---	0	---	---	---	---	---	---
Tidal swamp, mineral: TM.	0–10	Mucky loamy sand, mucky sand.	SP-SM, SM, SC-SM	A-3, A-2-4	0	100	100	80–95	5–25	---	NP
	10–40	Sand, fine sand, loamy sand.	SP-SM, SM, SC-SM	A-3, A-2-4	0	100	100	80–95	5–25	---	NP
Tidal swamp, organic: TO.	0–12	Muck, sapric material.	Pt	---	0	---	---	---	---	---	---
	12–15	Marl	ML, CL-ML	A-4	0	100	100	90–100	70–90	10–28	0–7
	15–65	Muck, sapric material.	Pt	---	0	---	---	---	---	---	---
Torry: Tr	0–36	Muck, sapric material.	Pt, OH	A-7	0	100	100	95–100	85–100	60–100	30–50
	36–65	Muck, sapric material.	Pt, OH	A-7	0	100	100	95–100	70–100	55–100	25–50
	65	Unweathered bedrock.									
Udorthents: UD	0–7	Cobbly fine sand.	SP, SP-SM	A-3, A-2-4	0–20	60–90	50–80	40–70	2–10	---	NP
	7–80	Extremely bouldery, variable.	---	---	0	0	0	0	0	---	---
Urban land: Ur. No ratings.											
Wabasso: Wa	0–22	Fine sand	SP, SP-SM	A-3	0	100	100	90–100	2–10	---	NP
	22–32	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	90–100	5–20	---	NP
	32–38	Fine sandy loam, sandy clay loam.	SC, SM, SM-SC	A-2-4, A-2-6	0	100	100	90–100	20–35	20–30	5–13
	38–72	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95–100	5–20	---	NP
Winder: Wn	0–16	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80–100	2–12	---	NP
	16–24	Fine sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2-4	0	60–80	50–75	40–100	15–35	<35	NP–20
	24–30	Fine sand, loamy fine sand.	SP, SM, SP-SM	A-3, A-2-4	0	60–80	50–75	40–100	3–20	---	NP
	30–50	Fine sand	SP, SP-SM	A-3, A-2-4	0	60–80	50–75	40–70	2–12	---	NP

Table 7.—*Physical and chemical properties of soils*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil that may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column. Dashes indicate data were not available. The symbol < means less than; > means greater than. The erosion tolerance factor (T) and wind erodibility group are for the entire profile]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Adamsville variant: AdB	0–36	6.0–20	0.02–0.05	6.1–8.4	<2	Low	High	Moderate	0.17	5	2
	36–65	0.6–2.0	0.20–0.25	6.6–8.4	<2	Low	High	Moderate	---		
Anclote: An	0–17	6.0–20	0.10–0.15	5.6–8.4	<2	Very low	Moderate	Moderate	0.17	5	2
	17–62	6.0–20	0.05–0.10	5.6–8.4	<2	Very low	Moderate	Low	0.17		
Arents, very steep: ASF	0–80	6.0–20	0.02–0.05	6.1–8.4	<2	Low	Low	Low	0.17	5	2
Arents: AU	0–60	6.0–20	0.02–0.08	5.1–7.3	<2	Low	High	Moderate	0.17	5	2
No ratings for Urban land part.											
Arents, organic substratum: AX.	0–39	6.0–20	0.02–0.08	5.1–7.3	<2	Low	High	Moderate	0.17	5	2
No ratings for Urban land part.	39–72	6.0–20	0.20–0.35	5.6–7.3	<2	Low	High	Moderate	---		
	72–80	6.0–20	0.02–0.08	5.6–7.3	<2	Low	High	Moderate	0.17		
*Basinger:											
Ba	0–72	>20	0.03–0.07	4.5–7.8	<2	Very low	High	Moderate	0.10	5	2
Bc	0–72	>20	0.03–0.07	4.5–7.8	<2	Very low	High	Moderate	0.10	5	2
No ratings for Urban land part.											
BM	0–72	>20	0.03–0.07	4.5–7.8	<2	Very low	High	Moderate	0.10	5	2
For Myakka part, see Myakka series.											
Beaches: Bn	0–60	>20	0.02–0.05	7.4–9.0	<16	Low	High	Low	0.15	5	1
Boca: Bo	0–5	6.0–20	0.05–0.10	5.1–7.3	<2	Low	High	Moderate	0.17	5	2
	5–29	6.0–20	0.02–0.05	5.1–7.3	<2	---	High	Moderate	0.17		
	29–34	0.6–2.0	0.10–0.15	6.6–8.4	<2	---	High	Moderate	0.20		
	34–36	---	---	---	---	---	---	---	---		
	36	---	---	---	---	---	---	---	---		
Canaveral: Cc	0–8	>20	0.02–0.05	6.6–8.4	<2	Very low	Moderate	Low	0.15	5	2
No ratings for Urban land part.	8–65	>20	0.02–0.05	6.6–8.4	<2	Very low	Moderate	Low	0.15		
Chobee: Ch	0–26	2.0–6.0	0.10–0.15	3.6–7.3	<2	Low	Moderate	Low	0.24	5	3
	26–37	0.6–2.0	0.12–0.17	7.4–8.4	<2	Moderate	Moderate	Low	0.32		
	37–40	6.0–20	0.06–0.10	7.4–8.4	<2	Low	Moderate	Low	0.20		
Cocoa: CuB	0–22	6.0–20	0.02–0.05	5.6–7.8	<2	Very low	Low	Low	0.17	3	2
No estimates for Urban land part.	22–30	6.0–20	0.05–0.10	5.6–7.8	<2	Very low	Low	Low	0.17		
	30	---	---	---	---	---	---	---	---		
Dania: Da	0–16	6.0–20	0.20–0.30	5.6–7.3	<2	Very low	High	Moderate	---	---	2
	16–18	6.0–20	0.02–0.10	6.6–8.4	<2	Low	High	Moderate	0.17		
	18	---	---	---	---	---	---	---	---		
Floridana: Fa	0–18	6.0–20	0.10–0.15	6.1–8.4	<2	Very low	Moderate	Low	0.17	5	2
	18–32	6.0–20	0.05–0.10	6.1–8.4	<2	Very low	Moderate	Low	0.32		
	32–44	0.6–2.0	0.10–0.15	6.1–8.4	<2	Low	Moderate	Low	0.20		
	44–65	6.0–20	0.05–0.10	6.1–8.4	<2	Low	Moderate	Low	0.17		
Hallandale: Ha	0–6	6.0–20	0.05–0.10	5.1–6.5	<2	Low	High	Low	0.17	2	2
	6–15	6.0–20	0.03–0.05	5.6–8.4	<2	Low	High	Low	0.17		
	15	---	---	---	---	---	---	---	---		
Holopaw: Ho	0–42	6.0–20	0.03–0.07	5.1–7.3	<2	Very low	High	Moderate	---	---	---
	42–47	2.0–6.0	0.10–0.15	6.1–8.4	<2	Low	High	Low	---		
	47–60	6.0–20	0.05–0.10	6.6–8.4	<2	Very low	High	Low	---		

TABLE 7.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Immokalee: Im	0–4	6.0–20	0.05–0.08	4.5–7.3	<2	Low	High	High	0.20	5	2
	4–37	6.0–20	0.02–0.05	4.5–6.5	<2	Low	High	High	0.20		
	37–79	0.6–6.0	0.10–0.15	3.6–6.0	<2	Low	High	High	0.17		
	79–80	6.0–20	0.02–0.05	4.5–6.0	<2	Low	High	High	0.20		
Jupiter: Ju	0–11	6.0–20	0.12–0.18	6.1–8.4	<2	Low	High	Low	0.17	2	2
	11–14	6.0–20	0.02–0.08	6.1–8.4	<2	Low	High	Low	0.17		
	14	----	----	----	----	----	----	----	----		
Lauderhill: La	0–26	6.0–20	0.20–0.25	6.1–8.4	<2	Low	High	Moderate	----	----	2
	26	----	----	----	----	----	----	----	----		
Myakka: Mk, Mu. No estimates for Urban land part of Mu.	0–26	6.0–20	0.02–0.05	4.5–6.5	<2	Low	High	High	0.20	5	2
	26–47	0.6–6.0	0.10–0.15	4.5–6.5	<2	Low	High	High	0.20		
	47–72	6.0–20	0.02–0.05	4.5–6.5	<2	Low	High	High	0.17		
Okeechobee: Oc	0–28	6.0–20	0.30–0.50	5.6–8.4	<2	Low	High	Low	----	----	2
	28–50	6.0–20	0.45–0.65	5.6–8.4	<2	Low	High	Low	----		
	50–66	6.0–20	0.30–0.50	5.6–8.4	<2	Low	High	Low	----		
Okeelanta: On	0–31	6.0–20	0.20–0.30	5.5–8.4	<2	Low	High	Moderate	----	----	2
	31–65	6.0–20	0.05–0.10	5.6–8.4	<2	Low	High	Moderate	----		
Oldsmar: Os	0–34	6.0–20	0.02–0.05	4.5–7.3	<2	Very low	Moderate	High	0.20	5	2
	34–42	0.6–6.0	0.10–0.15	4.5–6.5	<2	Low	Moderate	Moderate	0.20		
	42–46	0.6–6.0	0.10–0.15	6.1–8.4	<2	Low	Moderate	Low	0.24		
	46–50	6.0–20	0.05–0.10	6.1–8.4	2	Low	Moderate	Low	0.20		
Pahokee: Pa	0–42	6.0–20	0.20–0.25	5.6–7.3	<2	Low	High	Moderate	----	----	2
	42	----	----	----	----	----	----	----	----		
Palm Beach: PbB. No estimates for Urban land part.	0–80	>20	0.02–0.05	7.4–8.4	<2	Low	Low	Low	0.15	5	1
Paola: PcB	0–21	>20	0.02–0.05	4.5–6.5	<2	Very low	Low	High	0.15	5	1
	21–80	>20	0.02–0.05	4.5–6.5	<2	Very low	Low	High	0.15		
Pineda: Pd	0–34	6.0–20	0.02–0.05	4.5–6.5	<2	Low	High	Low	0.17	5	2
	34–44	2.0–6.0	0.10–0.15	6.1–7.8	<2	Low	High	Low	0.24		
	44–62	6.0–20	0.02–0.05	7.4–8.4	<2	Low	High	Low	0.17		
Pinellas: Pe	0–10	6.0–20	0.02–0.05	5.6–7.8	<2	Low	High	Low	0.17	5	2
	10–36	6.0–20	0.10–0.15	6.6–7.8	<2	Low	High	Low	0.17		
	36–54	0.6–2.0	0.10–0.15	6.6–8.4	<2	Low	High	Low	0.24		
	54–60	6.0–20	0.02–0.05	7.9–8.4	<2	Low	High	Low	0.17		
Pits: Pf. No estimates.											
Placid: Pg	0–17	6.0–20	0.15–0.20	3.6–5.5	<2	Very low	High	High	----	----	----
	17–60	6.0–20	0.05–0.08	3.6–5.5	<2	Very low	High	High	----		
Pomello: PhB	0–44	>20	0.02–0.05	4.5–6.0	<2	Very low	Low	High	0.17	5	1
	44–60	2.0–6.0	0.10–0.15	4.5–6.5	<2	Very low	Low	High	0.20		
	60–80	6.0–20	0.02–0.05	4.5–6.0	<2	Very low	Low	High	0.17		
Pompano: Po	0–80	>20	0.02–0.05	3.6–7.8	<2	Very low	High	Moderate	----	----	----
Quartzipsamments, shaped: QAB.	0–80	>20	0.02–0.05	4.5–8.4	<2	Very low	Low	Moderate	0.15	5	1
Riviera: Ra, Rd, Ru. No estimates for Urban land part of Ru.	0–28	6.0–20	0.05–0.08	5.6–6.5	<2	Low	High	High	0.17	4	2
	28–36	6.0–20	0.10–0.14	6.1–8.4	<2	Low	High	Low	0.28		
	36–42	2.0–6.0	0.12–0.15	6.6–8.4	<2	Low	High	Low	0.28		
	42–62	6.0–20	0.05–0.08	7.9–8.4	<2	Low	High	Low	0.15		
Sanibel: Sa	12–0	6.0–20	0.20–0.25	5.1–7.3	<2	Low	High	Low	----	----	2
	0–60	6.0–20	0.05–0.10	5.1–7.3	<2	Low	High	Low	0.15		

TABLE 7.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
St. Lucie: ScB, SuB	0–80	>20	0.02–0.05	4.5–6.5	<2	Very low	Low	Moderate	0.15	5	1
No estimates for Urban land part of SuB.											
Tequesta: Ta	12–0	6.0–20	0.20–0.25	5.1–7.3	<2	Very low	High	Low	---	---	2
	0–32	6.0–20	0.05–0.10	5.1–7.3	<2	Low	High	Low	0.20		
	32–60	0.6–6.0	0.10–0.15	6.1–8.4	<2	Low	High	Low	0.32		
	60–70	6.0–20	0.02–0.05	6.1–8.4	<2	Low	High	Low	0.20		
Terra Ceia: Tc	0–65	6.0–20	0.30–0.50	4.5–8.4	<2	Low	Moderate	Moderate	---	---	2
Tidal swamp, mineral: TM	0–10	6.0–20	0.15–0.20	6.1–9.0	8–16	Low	High	Moderate	0.17	5	2
	10–40	6.0–20	0.05–0.10	4.0–7.8	4–16	Low	High	High	0.15		
Tidal swamp, organic: TO	0–12	6.0–20	0.20–0.25	6.6–9.0	8–16	Moderate	High	Low	---	---	---
	12–15	2.0–6.0	0.12–0.17	7.9–8.4	4–16	Low	High	Low	---		
	15–65	6.0–20	0.20–0.25	6.6–8.4	4–16	Moderate	High	Low	---		
Torry: Tr	0–36	0.6–2.0	0.20–0.25	5.1–7.3	<2	Moderate	High	Moderate	---	---	2
	36–65	6.0–20	0.20–0.30	5.1–7.3	<2	Moderate	High	Moderate	---		
Udorthents: UD	0–7	6.0–20	0.02–0.05	7.4–8.4	<2	Low	Low	Low	0.17	5	2
	7–80	---	---	---	---	---	---	---	---		
Urban land: Ur. No estimates.											
Wabasso: Wa	0–22	6.0–20	0.02–0.05	3.6–6.5	<2	Low	Moderate	High	0.20	5	2
	22–32	0.6–2.0	0.10–0.15	4.5–7.3	<2	Low	Moderate	High	0.20		
	32–38	0.6–2.0	0.10–0.15	5.6–7.8	<2	Low	Low	Low	0.24		
	38–72	6.0–20	0.05–0.10	7.4–7.8	<2	Low	Low	Low	0.17		
Winder: Wn	0–16	6.0–20	0.03–0.08	5.6–7.8	<2	Low	High	Low	0.15	5	2
	16–24	0.6–2.0	0.06–0.12	6.1–8.4	<2	Low	High	Low	0.32		
	24–30	6.0–20	0.03–0.06	7.4–8.4	<2	Low	High	Low	0.20		
	30–50	6.0–20	0.03–0.06	7.4–8.4	<2	Low	High	Low	0.20		

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and is of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

An *aquifer-fed excavated pond* is a body of water created by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by runoff and embankment ponds that impound water three feet or more above the original surface. Ratings in table 8 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of cropland and pasture is affected by such soil properties as permeability, texture and structure; depth to claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; salinity or alkalinity; and availability of outlets for drainage.

Irrigation of soil is affected by such features as slope, soil texture, content of stones, accumulation of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil layers below the surface layer and in fragipans or other layers that restrict movement of water, amount of water held available for plants, need for drainage, and depth to the water table or bedrock.

Construction materials for engineering uses

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction material. Each soil is evaluated to the depth observed and described as the survey is made, generally about 6 feet.

Roadfill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment and properly compacted and provided with adequate drainage and the relative ease of exca-

TABLE 8.—*Water management*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil that may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Limitations for—			Features affecting—	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation
Adamsville variant: AdB	Severe: seepage	Severe: seepage, piping, unstable fill.	Moderate: deep to water.	Cutbanks cave	Droughty, too sandy.
Anclote: An	Severe: seepage	Severe: piping, seepage.	Slight	Wetness, poor outlets.	Wetness.
Arents, very steep: ASF	Severe: slope	Severe: erodes easily, piping.	Severe: no water	Not needed	Erodes easily, slope, seepage.
Arents: AU No evaluations for Urban land part.	Severe: seepage	Severe: seepage	Moderate: deep to water.	Cutbanks cave	Too sandy.
Arents, organic substratum: AX No evaluations for Urban land part.	Severe: seepage	Severe: seepage, piping, unstable fill.	Moderate: deep to water.	Cutbanks cave	Too sandy.
*Basinger:					
Ba, Bc No evaluations for Urban land part of Bc.	Severe: seepage	Severe: seepage, piping, unstable fill.	Slight	Cutbanks cave, wetness.	Wetness.
BM For Myakka part, see Myakka series.	Severe: seepage	Severe: seepage, piping, unstable fill.	Slight	Cutbanks cave, wetness, poor outlets.	Wetness.
Beaches: Bn. No evaluations.					
Boca: Bo	Severe: depth to rock, seepage.	Severe: piping, thin layer, unstable fill.	Moderate: depth to rock.	Depth to rock, wetness.	Seepage, wetness.
Canaveral: Cc No evaluations for Urban land part.	Severe: seepage	Severe: seepage, piping, unstable fill.	Moderate: deep to water.	Cutbanks cave, wetness.	Droughty, fast intake.
Chobee: Ch	Moderate: seepage.	Moderate: thin layer.	Moderate: slow refill.	Floods, poor outlets, wetness.	Floods, wetness.
Cocoa: CuB No evaluations for Urban land part.	Severe: depth to rock, seepage.	Severe: piping, seepage, unstable fill.	Severe: no water	Not needed	Droughty, fast intake.
Dania: Da	Severe: depth to rock, seepage.	Severe: compressible, low strength, seepage.	Severe: depth to rock.	Depth to rock, wetness.	Rooting depth, seepage.
Floridana: Fa	Moderate: seepage.	Severe: seepage, piping, unstable fill.	Slight	Floods, wetness, cutbanks cave.	Floods, wetness.
Hallandale: Ha	Severe: depth to rock, seepage.	Severe: unstable fill, seepage, piping.	Severe: large stones.	Depth to rock, floods, wetness.	Rooting depth, wetness.
Holopaw: Ho	Severe: seepage	Severe: piping, seepage.	Slight	Wetness, cutbanks cave.	Wetness, fast intake.
Immokalee: Im	Severe: seepage	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Wetness.

TABLE 8.—*Water management*—Continued

Soil name and map symbol	Limitations for—			Features affecting—	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation
Jupiter: Ju	Severe: depth to rock, seepage.	Severe: unstable fill, seepage, piping.	Severe: depth to rock.	Depth to rock, floods, wetness.	Rooting depth, too sandy, wetness.
Lauderhill: La	Severe: depth to rock, excess humus.	Severe: excess humus, low strength, shrink-swell.	Severe: depth to rock.	Depth to rock, excess humus, wetness.	Wetness.
Myakka:					
Mk, Mu No evaluations for Urban land part of Mu.	Severe: seepage	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Wetness.
Myakka part of BM	Severe: seepage	Severe: seepage, piping, erodes easily.	Slight	Cutbanks cave, wetness, poor outlets.	Wetness.
Okeechobee: Oc	Severe: excess humus, seepage.	Severe: excess humus, seepage, unstable fill.	Slight	Wetness, excess humus.	Wetness.
Okeelanta: On	Severe: excess humus.	Severe: compressible, excess humus, low strength.	Slight	Excess humus, wetness.	Wetness.
Oldsmar: Os	Severe: seepage	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Fast intake, wetness.
Pahokee: Pa	Severe: excess humus, seepage.	Severe: excess humus, low strength, seepage.	Slight	Excess humus, wetness, depth to rock.	Wetness.
Palm Beach: PbB No evaluations for Urban land part.	Severe: seepage	Severe: seepage, unstable fill, piping.	Severe: no water	Not needed	Droughty, fast intake.
Paola: PcB	Severe: seepage	Severe: seepage, piping, unstable fill.	Severe: no water	Not needed	Droughty, too sandy, fast intake.
Pineda: Pd	Severe: seepage	Moderate: seepage, thin layer, unstable fill.	Moderate: deep to water.	Cutbanks cave	Wetness.
Pinellas: Pe	Moderate: seepage.	Severe: thin layer, seepage, piping.	Slight	Cutbanks cave, wetness.	Wetness.
Pits: Pf. No evaluations.					
Placid: Pg	Severe: seepage	Severe: seepage, piping.	Slight	Wetness, cutbanks cave.	Wetness.
Pomello: PhB	Severe: seepage	Severe: seepage, piping, unstable fill.	Moderate: deep to water.	Not needed	Fast intake, droughty.
Pompano: Po	Severe: seepage	Severe: seepage, piping, erodes easily.	Slight	Wetness, cutbanks cave.	Wetness.
Quartzipsamments, shaped: QAB.	Severe: seepage	Severe: seepage, piping, erodes easily.	Severe: no water	Not needed	Droughty, too sandy.

TABLE 8.—*Water management*—Continued

Soil name and map symbol	Limitations for—			Features affecting—	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation
Riviera:					
Ra, Ru	Severe: seepage	Severe: thin layer, seepage.	Slight	Wetness, cutbanks cave.	Wetness.
No evaluations for Urban land part of Ru.					
Rd	Severe: seepage	Severe: thin layer, seepage.	Slight	Poor outlets, cutbanks cave, wetness.	Wetness.
Sanibel: Sa	Severe: excess humus, seepage.	Severe: excess humus, low strength, unstable fill.	Slight	Cutbanks cave, wetness, poor outlets.	Wetness.
St. Lucie: ScB, SuB	Severe: seepage	Severe: seepage, piping, unstable fill.	Severe: no water	Not needed	Droughty, too sandy, fast intake.
No evaluations for Urban land part of SuB.					
Tequesta: Ta	Moderate: seepage.	Severe: excess humus, seepage, compressible.	Slight	Wetness	Wetness.
Terra Ceia: Tc	Severe: excess humus, seepage.	Severe: excess humus, seepage, unstable fill.	Slight	Wetness, excess humus.	Wetness.
Tidal swamp, mineral: TM	Severe: seepage	Moderate: seepage, piping.	Slight	Floods, cutbanks cave, wetness.	Floods, wetness.
Tidal swamp, organic: TO	Severe: excess humus, seepage.	Severe: excess humus, compressible, seepage.	Slight	Excess humus, floods, wetness.	Floods, wetness.
Torry: Tr	Moderate: excess humus, seepage.	Severe: excess humus.	Slight	Excess humus, poor outlets.	Wetness.
Udorthents: UD	Severe: seepage	Severe: large stones, seepage.	Severe: large stones, no water.	Not needed	Slope, fast intake, droughty.
Urban land: Ur. No evaluations.					
Wabasso: Wa	Severe: seepage	Severe: seepage, piping, unstable fill.	Slight	Cutbanks cave, wetness.	Wetness.
Winder: Wn	Moderate: seepage.	Slight	Slight	Floods, wetness	Floods, wetness.

vating the material at borrow areas. A soil that has been stabilized with lime or cement is not considered in the ratings. The suitability ratings apply to the soil pedon between the A horizon and a depth of 5 to 6 feet. In excavating and spreading, soil horizons will be mixed. Many soils have horizons of contrasting suitability within the pedon. The estimated engineering properties in table 9 provide more specific information about the nature of each horizon that can help determine its suitability for roadfill.

According to the Unified soil classification system, soils rated *good* have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as high shrink-swell potential, high potential frost action, steep slopes, wetness, or many stones. If the suitable material is less than 3 feet thick, the entire soil is rated *poor*.

Sand and gravel are used in large quantities in construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable

TABLE 9.—*Construction materials*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil that may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Suitability of the soil for—			
	Roadfill	Sand	Gravel	Topsoil
Adamsville variant: AdB	Poor: excess humus, thin layer.	Fair: excess humus, thin layer.	Unsuited	Poor: too sandy.
Anclote: An	Poor: wetness	Fair: excess humus	Unsuited	Poor: wetness.
Arents, very steep: ASF	Severe: slope	Fair: excess fines	Unsuited	Poor: slope.
Arents: AU No ratings for Urban land part.	Fair: wetness	Fair: excess fines	Unsuited	Poor: too sandy.
Arents, organic substratum: AX No ratings for Urban land part.	Poor: excess humus, thin layer.	Fair: excess humus, thin layer.	Unsuited	Poor: too sandy.
*Basinger: Ba, Bc, BM No ratings for Urban land part of Bc. For Myakka part of BM, see Myakka series.	Poor: wetness	Fair: excess fines	Unsuited	Poor: too sandy, wetness.
Beaches: Bn. No ratings.				
Boca: Bo	Poor: thin layer, wetness.	Poor: excess fines, thin layer.	Unsuited	Poor: too sandy, wetness.
Canaveral: Cc No ratings for Urban land part.	Fair: wetness	Good	Unsuited	Poor: too sandy.
Chobee: Ch	Poor: wetness	Unsuited	Unsuited	Poor: thin layer, wetness.
Cocoa: CuB No ratings for Urban land part.	Good	Fair: excess fines	Unsuited	Poor: too sandy.
Dania: Da	Poor: excess humus, thin layer, wetness.	Unsuited	Unsuited	Poor: wetness.
Floridana: Fa	Poor: wetness	Poor: excess fines	Unsuited	Poor: too sandy, wetness.
Hallandale: Ha	Poor: wetness, thin layer.	Poor: thin layer	Unsuited	Poor: too sandy, wetness.
Holopaw: Ho	Poor: wetness	Good	Unsuited	Poor: too sandy, wetness.
Immokalee: Im	Poor: wetness	Fair: excess fines	Unsuited	Poor: too sandy, wetness.
Jupiter: Ju	Poor: thin layer, wetness.	Poor: thin layer	Unsuited	Poor: too sandy, wetness, thin layer.
Lauderhill: La	Poor: excess humus, low strength, wetness.	Unsuited	Unsuited	Poor: wetness.
Myakka: Mk, Mu No ratings for Urban land part of Mu.	Poor: wetness	Fair: excess fines	Unsuited	Poor: too sandy, wetness.
Myakka part of BM	Poor: wetness	Fair: excess fines	Unsuited	Poor: too sandy.
Okeechobee: Oc	Poor: wetness, low strength, excess humus.	Unsuited	Unsuited	Poor: wetness.
Okeelanta: On	Poor: excess humus, low strength, wetness.	Unsuited	Unsuited	Poor: wetness.

TABLE 9.—*Construction materials*—Continued

Soil name and map symbol	Suitability of the soil for—			
	Roadfill	Sand	Gravel	Topsoil
Oldsmar: Os	Poor: wetness	Fair: excess fines	Unsuited	Poor: too sandy, wetness.
Pahokee: Pa	Poor: excess humus, low strength, wetness.	Unsuited	Unsuited	Poor: wetness.
Palm Beach: PbB No ratings for Urban land part.	Good	Good	Unsuited	Poor: too sandy.
Paola: PcB	Good	Good	Unsuited	Poor: too sandy.
Pineda: Pd	Poor: wetness	Fair: excess fines	Unsuited	Poor: too sandy, wetness.
Pinellas: Pe	Poor: wetness	Poor: excess fines	Unsuited	Poor: too sandy, wetness.
Pits: Pf. No ratings.				
Placid: Pg	Poor: wetness	Fair: excess fines	Unsuited	Poor: too sandy, wetness.
Pomello: PhB	Good	Fair: excess fines	Unsuited	Poor: too sandy.
Pompano: Po	Poor: wetness	Good	Unsuited	Poor: too sandy, wetness.
Quartzipsamments, shaped: QAB	Good	Good	Unsuited	Poor: too sandy.
Riviera: Ra, Rd, Ru No ratings for Urban land part of Ru.	Poor: wetness	Poor: excess fines	Unsuited	Poor: too sandy, wetness.
Sanibel: Sa	Poor: excess humus, low strength, wetness.	Good	Unsuited	Poor: wetness.
St. Lucie: ScB, SuB No ratings for Urban land part of SuB.	Good	Good	Unsuited	Poor: too sandy.
Tequesta: Ta	Poor: excess humus, wetness.	Poor: excess humus	Unsuited	Poor: wetness.
Terra Ceia: Tc	Poor: wetness, excess humus, low strength.	Unsuited	Unsuited	Poor: wetness.
Tidal swamp, mineral: TM	Poor: wetness	Poor: excess fines	Unsuited	Poor: excess salt, wetness.
Tidal swamp, organic: TO	Poor: excess humus	Unsuited	Unsuited	Poor: excess salt, wetness.
Torry: Tr	Poor: excess humus, wetness.	Unsuited	Unsuited	Poor: wetness.
Udorthents: UD	Severe: slope, large stones.	Unsuited	Unsuited	Poor: slope, large stones.
Urban land: Ur. No ratings.				
Wabasso: Wa	Poor: wetness	Poor: excess fines	Unsuited	Poor: too sandy, wetness.
Winder: Wn	Poor: wetness	Poor: excess fines	Unsuited	Poor: thin layer, wetness.

quantities of sand or gravel. A soil rated as a *good* or *fair* source of sand or gravel generally has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account thickness of overburden, depth to the water table, or other factors that affect excavation of the material. Grain size and the percentage of coarse fragments are given in table 6.

Topsoil is used to topdress an area where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material to prepare a seedbed and by the ability of the soil material to sustain the growth of plants. Also considered is the damage that would result to the area from which the topsoil is taken.

Soils rated *good* have at least 16 inches of friable loamy material at the surface. They are free of stones, are low in content of gravel and other coarse fragments, and have gentle slopes. They are low in soluble salts that can limit plant growth and are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils, firm loamy soils, or clayey soils that have suitable material only 8 to 16 inches thick or soils that have appreciable amounts of coarse fragments or soluble salt.

Soils rated *poor* are very sandy soils; very firm clayey soils; soils that have suitable layers less than 8 inches thick; soils that have large amounts of coarse fragments or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high organic-matter content, a surface horizon is much preferred as topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. Because the absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter, the material from these horizons should be carefully preserved and used.

Soil and water features

Features that relate to runoff or infiltration of water, to flooding, to grading and excavation, and to subsidence of each soil are indicated in table 10. This information is helpful in planning land uses and engineering projects that are likely to be affected by the amount of runoff from watersheds, by flooding and a seasonal high water table, by the presence of bedrock or a cemented pan in the upper 5 or 6 feet of the soil, or by subsidence.

Hydrologic groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is rated in general terms that describe the frequency, duration, and period of the year when flooding is most likely. The ratings are based on evidence in the soil pedon of the effects of flooding. This evidence includes thin strata of sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. These ratings are also based on local information about floodwater heights and the extent of flooding, and local knowledge that relates the unique landscape position of each soil to historic floods.

The generalized description of flood hazards is of value in land use planning and provides a valid basis for land use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that depict flood-prone areas at specific flood frequency levels.

A seasonal high water table is the highest level of a saturated zone more than 6 inches thick held in soils for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors, or mottles, in the soil and the depth to free water observed during the course of the soil survey. Indicated in these estimates are the depth to the seasonal high water table; the kind of water table, whether perched, artesian, or apparent; and the months of the year that the high water commonly is present. Only those saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps to assess the ease of excavation, the need for specially designed foundations, and the need for specific kinds of drainage systems. Such information is also needed to determine how septic tank absorption fields and other underground installations will function.

Depth to bedrock is shown for all soils that rest on bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on meas-

TABLE 10.—*Soil and water features*

[Absence of an entry indicates the feature is not a concern. See text for a description of the hydrologic groups. The definition of "water table" in the Glossary explains the term "apparent." The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Subsidence	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Initial	Total
					Ft			*In*		*In*	*In*
Adamsville variant:											
AdB	C	None			2.0–3.5	Apparent	Jun–Nov	>60		1–2	5–10
Anclote: An	D	None			0–1.0	Apparent	Jun–Dec	>60			
Arents, very steep: ASF	B	None			>6.0			>60			
Arents: AU	C	None			2.0–4.0	Apparent	Jun–Nov	>60			
No ratings for Urban land part.											
Arents, organic substratum: AX	C	None			2.0–3.0	Apparent	Jun–Nov	>60		5–10	15–25
No ratings for Urban land part.											
Basinger: Ba, Bc	A/D	None			0–1.0	Apparent	Jun–Nov	>60			
No ratings for Urban land part of Bc.											
BM (both parts)	A/D	Frequent	Very long	Jun–Jan	+1–1.0	Apparent	Jun–Feb	>60			
Beaches: Bn		Frequent	Very long	Jan–Dec	0–1.0	Apparent	Jan–Dec	>60			
Boca: Bo	B/D	None			0–1.0	Apparent	Jun–Oct	24–40	Rippable		
Canaveral: Cc	C	None			1.0–3.0	Apparent	Jun–Nov	>60			
No ratings for Urban land part.											
Chobee: Ch	B/D	Frequent	Very long	Jun–Feb	0–1.0	Apparent	Jun–Feb	>60			
Cocoa: CuB	A	None			>6.0			20–40	Hard		
No ratings for Urban land part.											
Dania: Da	A/D	Frequent	Very long	Jun–Jan	+1–1.0	Apparent	Jun–Feb	8–20	Hard	4–8	8–14
Floridana: Fa	A/D	Frequent	Very long	Jun–Feb	0–1.0	Apparent	Jun–Feb	>60			
Hallandale: Ha	A/D	Frequent	Brief	Jun–Oct	0–1.0	Apparent	Jun–Nov	>50	Rippable		
Holopaw: Ho	B/D	None			0–1.0	Apparent	Jun–Nov	>60			
Immokalee: Im	A/D	None			0–1.0	Apparent	Jun–Feb	>60			
Jupiter: Ju	A/D	Frequent	Brief	Jun–Oct	0–1.0	Apparent	Jun–Nov	8–20	Rippable		
Lauderhill: La	A/D	Frequent	Very long	Jun–Jan	+1–1.0	Apparent	Jun–Feb	20–40	Hard	4–8	16–36
Myakka: Mk, Mu	A/D	None			0–1.0	Apparent	Jun–Feb	>60			
No ratings for Urban land part of Mu.											
Okeechobee: Oc	A/D	Frequent	Very long	Jun–Jan	+1–1.0	Apparent	Jun–Apr	>60		4–8	50–65
Okeelanta: On	A/D	Frequent	Very long	Jun–Jan	+1–0	Apparent	Jun–Jan	>60		4–8	16–30
Oldsmar: Os	B/D	None			0–1.0	Apparent	Jun–Nov	>60			
Pahokee: Pa	A/D	Frequent	Very long	Jun–Jan	+1–0.	Apparent	Jun–Feb	36–51	Hard	4–8	36–50
Palm Beach: PbB	A	None			>6.0			>60			
No ratings for Urban land part.											
Paola: PcB	A	None			>6.0			>60			
Pineda: Pd	B/D	Frequent	Long	Jul–Oct	0–1.0	Apparent	Jun–Nov	>60			
Pinellas: Pe	B/D	None			0–1.0	Apparent	Jun–Nov	>60			
Pits: Pf.											
No ratings.											
Placid: Pg	A/D	None			0–1.0	Apparent	Jun–Feb	>60			
Pomello: PhB	C	None			2.0–3.5	Apparent	Jul–Nov	>60			
Pompano: Po	A/D	None			0–1.0	Apparent	Jun–Nov	>60			
Quartzipsamments, shaped: QAB	A	None			>6.0			>60			
Riviera:											
Ra	B/D	None			0–1.0	Apparent	Jun–Dec	>60			
Rd	B/D	Frequent	Very long	Jun–Jan	+2–1.0	Apparent	Jun–Mar	>60			
Ru	B/D	None			0–1.0	Apparent	Jun–Dec	>60			
No ratings for Urban land part.											
Sanibel: Sa	A/D	Frequent	Very long	Jun–Jan	+1–0	Apparent	Jun–Feb	>60		3–5	8–15

TABLE 10.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Subsidence	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Initial	Total
					Ft			*In*		*In*	*In*
St. Lucie: ScB, SuB	A	None			>6.0			>60			
No ratings for Urban land part of SuB.											
Tequesta: Ta	B/D	Frequent	Very long	Jun–Jan	+2–1.0	Apparent	Jan–Dec	>60		3–6	8–12
Terra Ceia: Tc	A/D	Frequent	Very long	Jun–Jan	+1–1.0	Apparent	Jun–Apr	>60	Hard	4–8	50–60
Tidal swamp, mineral: TM	D	Frequent	Very long	Jan–Dec	+2–1.0	Apparent	Jan–Dec	>60			
Tidal swamp, organic: TO	D	Frequent	Very long	Jan–Dec	+2–1.0	Apparent	Jan–Dec	>60		3–6	40–60
Torry: Tr	A/D	Frequent	Very long	Jun–Jan	+1–1.0	Apparent	Jun–Feb	>51	Hard	3–6	16–30
Udorthents: UD	B	None			>6.0			>60			
Urban land: Ur. No ratings.											
Wabasso: Wa	B/D	None			0–1.0	Apparent	Jun–Oct	>60			
Winder: Wn	B/D	Frequent	Long	Jul–Oct	0–1.0	Apparent	Jun–Dec	>60			

urements made in many soil borings and other observations during the soil mapping. Hardness of bedrock as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200 horsepower tractor, but hard bedrock generally requires blasting.

Subsidence is the settlement of organic soils or of soils containing semifluid layers. Initial subsidence generally results from local drainage. Total subsidence is initial subsidence plus the slow lowering of elevation over a period of several years because of oxidation or compression of organic material.

Recreation

In table 11 the soils are rated according to their suitability for various kinds of recreation. The requirements for such recreation sites are given in the following paragraphs.

Camp areas require such site preparation as shaping and leveling tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils for this use have mild slopes and are neither wet nor subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet but not dusty when dry; are free of flooding during the period of use; and do not have slopes or stoniness that greatly increase cost of leveling sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry. If grading and leveling are required, the depth to rock is important.

The design and layout of paths and trails for walking, horseback riding, and bicycling should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the period of use. They should have moderate slopes and few or no stones or boulders on the surface.

Town and Country Planning

The purpose of this part of the survey is to furnish information on the limitations of the soils for town and country planning. This information can be used by planning commissions, boards, contractors, realtors, engineers, landowners, home builders, and others to understand and interpret soils for this use.

The continuing population influx within Palm Beach County Area places increasing emphasis and demand on the use of land for schools, churches, shopping centers, small industrial sites, residential development, and associated uses. As the towns and communities grow, serious problems of land use, pollution, and related problems increase.

While many factors other than soils are important in planning for orderly development, soil quality is a basic and continuing factor. It demands full consideration, not only as a guide in determining use, but also as a measure of the kind and magnitude of problems that must be overcome for specific uses. While it may not be practical to put all soils to their highest possible use, full knowledge of the problems that must be solved permits deliberate adjustment in use. Soil qualities are important in planning for industrial, residential, and related urban uses.

TABLE 11.—*Recreational development*

Soil name and map symbol	Degree and kind of limitations for—			
	Camp areas	Picnic areas	Playgrounds	Paths and trails
Adamsville variant: AdB	Severe: too sandy	Severe: too sandy	Severe: slope, too sandy.	Severe: too sandy.
Anclote: An	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Arents, very steep: ASF	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Arents: AU No ratings for Urban land part.	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy.
Arents, organic substratum: AX No ratings for Urban land part.	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy.
Basinger: Ba, Bc, BM Ratings also apply to Myakka part of BM. No ratings for Urban land part of Bc.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Beaches: Bn. No ratings.				
Boca: Bo	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.
Canaveral: Cc No ratings for Urban land part.	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy.
Chobee: Ch	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Cocoa: CuB No ratings for Urban land part.	Moderate: too sandy	Moderate: too sandy	Severe: slope, too sandy.	Moderate: too sandy.
Dania: Da	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Floridana: Fa	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Hallandale: Ha	Severe: floods, wetness, too sandy.	Severe: floods, wetness, too sandy.	Severe: depth to rock, floods, wetness.	Severe: floods, wetness, too sandy.
Holopaw: Ho	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
Immokalee: Im	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Jupiter: Ju	Severe: floods, too sandy, wetness.	Severe: floods, too sandy, wetness.	Severe: floods, too sandy, wetness.	Severe: floods, too sandy, wetness.
Lauderhill: La	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: depth to rock, wetness, excess humus.	Severe: excess humus, wetness.
Myakka: Mk, Mu No ratings for Urban land part of Mu.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Okeechobee: Oc	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Okeelanta: On	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.
Oldsmar: Os	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.
Pahokee: Pa	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.

TABLE 11.—*Recreational development*—Continued

Soil name and map symbol	Degree and kind of limitations for—			
	Camp areas	Picnic areas	Playgrounds	Paths and trails
Palm Beach: PbB. No ratings for Urban land part.	Severe: too sandy	Severe: too sandy	Severe: too sandy, slope.	Severe: too sandy.
Paola: PcB	Severe: too sandy	Severe: too sandy	Severe: too sandy, soil blowing.	Severe: too sandy.
Pineda: Pd	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Pinellas: Pe	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Pits: Pf. No ratings.				
Placid: Pg	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Pomello: PhB	Severe: too sandy	Severe: too sandy	Severe: too sandy, slope.	Severe: too sandy.
Pompano: Po	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Quartzipsamments, shaped: QAB	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy.
Riviera: Ra, Rd, Ru. No ratings for Urban land part of Ru.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Sanibel: Sa	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.
St. Lucie: ScB, SuB. No ratings for Urban land part of SuB.	Severe: too sandy	Severe: too sandy	Severe: too sandy, soil blowing.	Severe: too sandy.
Tequesta: Ta	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Terra Ceia: Tc	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Tidal swamp, mineral: TM	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Tidal swamp, organic: TO	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.
Torry: Tr	Severe: excess humus, wetness, too clayey.	Severe: excess humus, wetness, too clayey.	Severe: excess humus, wetness, too clayey.	Severe: excess humus, wetness, too clayey.
Udorthents: UD	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, too sandy.
Urban land: Ur. No ratings.				
Wabasso: Wa	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Winder: Wn	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.

The soil interpretations are concerned with limitations, restrictions, or hazards imposed by soil conditions when the land is put to a specific use. Good land use planning requires careful consideration of these factors.

The soils map can be a useful tool in planning and developing areas for town and country uses. It should be emphasized, however, that the interpretations do not eliminate the need for more detailed onsite investigations of selected sites. It should also be pointed out that the examinations of the soils were only to a depth of about 5 to 7 feet. Where information is needed below

these depths, additional field examination is advisable. It is especially important to make additional onsite investigations of small areas planned for very intensive use, because many delineated areas of a given soil mapping unit contain small spots of other kinds of soil that have strongly contrasting properties and different limitations for the planned use. Even in these situations, however, the soil map is very useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Most of the information in this section is presented in tables 12 and 13, which show the degree and kind of soil limitations, restrictions, or hazards for selected uses of the soils. Additional information useful to planning boards, commissions, contractors, realtors, and others interested in urban development can be found in other sections of the soil survey, particularly the sections "Descriptions of the Soils" and "Engineering."

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 12. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined and the presence of very firm or extremely firm horizons, generally difficult to excavate, is indicated.

Dwellings and small commercial buildings, referred to in table 12, are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking, or subsidence from settling, or shear failure of the foundation do not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and the large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Local roads and streets, referred to in table 12, have an all-weather surface that can carry light to medium traffic all year. They have a subgrade of underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded with soil material at hand. Most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The AASHTO and Unified classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones, all of which affect stability and ease of excavation, were also considered.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that deal with the ease of excavation or the installation of these facilities will be of interest to contractors and local officials. Table 13 shows the degree and kind of limitations of each soil for these uses and for use of the soil as daily cover for landfills.

If the degree of soil limitation is indicated by the rating *slight*, soils are favorable for the specific use and limitations are minor and easily overcome. If *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design. If *severe*, soil properties or site features are so unfavorable or so difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between a depth of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and a shallow depth to bedrock interfere with installation. Excessive slope may cause lateral

TABLE 12.—*Building site development*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil that may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Degree and kind of limitations for—				
	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Adamsville variant: AdB	Severe: cutbanks cave, excess humus, wetness.	Severe: excess humus, low strength.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength.
Anclote: An	Severe: wetness, cutbanks cave.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Arents, very steep: ASF	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Arents: AU No ratings for Urban land part.	Severe: cutbanks cave.	Moderate: wetness.	Severe: wetness	Moderate: wetness.	Moderate: wetness.
Arents, organic substratum: AX No ratings for Urban land part.	Severe: cutbanks cave, excess humus.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength.
*Basinger:					
Ba, Bc No ratings for Urban land part of Bc.	Severe: cutbanks cave, wetness.	Severe: wetness	Severe: wetness	Severe: corrosive, wetness.	Severe: wetness.
BM For Myakka part, see Myakka series.	Severe: cutbanks cave, wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: corrosive, wetness, floods.	Severe: wetness, floods.
Beaches: Bn. No ratings.					
Boca: Bo	Severe: depth to rock, wetness.	Severe: wetness	Severe: depth to rock, wetness.	Severe: corrosive, depth to rock, wetness.	Severe: wetness.
Canaveral: Cc No ratings for Urban land part.	Severe: cutbanks cave, wetness.	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness.
Chobee: Ch	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Cocoa: CuB No ratings for Urban land part.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, slope.	Moderate: depth to rock.
Dania: Da	Severe: depth to rock, excess humus, wetness.	Severe: excess humus, low strength, wetness.	Severe: depth to rock, low strength, wetness.	Severe: depth to rock, low strength, wetness.	Severe: low strength, excess humus, wetness.
Floridana: Fa	Severe: cutbanks cave, floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: corrosive, floods, wetness.	Severe: floods, wetness.
Hallandale: Ha	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: floods, depth to rock, wetness.	Severe: depth to rock, floods, wetness.
Holopaw: Ho	Severe: wetness, cutbanks cave.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Immokalee: Im	Severe: cutbanks cave, wetness.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.

TABLE 12.—*Building site development*—Continued

Soil name and map symbol	Degree and kind of limitations for—				
	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Jupiter: Ju	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.
Lauderhill: La	Severe: depth to rock, wetness, floods.	Severe: wetness, excess humus, low strength.	Severe: depth to rock, wetness, low strength.	Severe: excess humus, wetness, low strength.	Severe: excess humus, wetness, low strength.
Myakka:					
Mk, Mu No ratings for Urban land part of Mu.	Severe: cutbanks cave, wetness.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Myakka part of BM	Severe: cutbanks cave, wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Okeechobee: Oc	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, low strength.	Severe: wetness, excess humus, low strength.	Severe: wetness, excess humus, low strength.	Severe: wetness, excess humus, low strength.
Okeelanta: On	Severe: excess humus, wetness, floods.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: wetness, excess humus, low strength.	Severe: excess humus, low strength, wetness.
Oldsmar: Os	Severe: cutbanks cave, wetness.	Severe: wetness	Severe: wetness	Severe: corrosive, wetness.	Severe: wetness.
Pahokee: Pa	Severe: excess humus, wetness, depth to rock.	Severe: excess humus, low strength, wetness.	Severe: wetness, excess humus, low strength.	Severe: wetness, excess humus, low strength.	Severe: excess humus, low strength, wetness.
Palm Beach: PbB No ratings for Urban land part.	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Paola: PcB	Severe: cutbanks cave.	Slight	Slight	Moderate: slope	Slight.
Pineda: Pd	Severe: floods, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Pinellas: Pe	Severe: cutbanks cave, wetness.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Pits: Pf. No ratings.					
Placid: Pg	Severe: wetness, cutbanks cave.	Severe: wetness	Severe: wetness	Severe: wetness, corrosive.	Severe: wetness.
Pomello: PhB	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness	Moderate: corrosive, wetness, slope.	Slight.
Pompano: Po	Severe: wetness, cutbanks cave.	Severe: wetness	Severe: wetness	Severe: wetness, corrosive.	Severe: wetness.
Quartzipsamments, shaped: QAB.	Severe: cutbanks cave.	Slight	Slight	Moderate: slope	Slight.
Riviera:					
Ra, Ru No ratings for Urban land part of Ru.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: corrosive, wetness.	Severe: wetness.

TABLE 12.—*Building site development*—Continued

Soil name and map symbol	Degree and kind of limitations for—				
	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Rd	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Sanibel: Sa	Severe: excess humus, wetness, cutbanks cave.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: wetness, low strength, excess humus.	Severe: excess humus, low strength, wetness.
St. Lucie: ScB, SuB. No ratings for Urban land part of SuB.	Severe: cutbanks cave.	Slight	Slight	Moderate: slope	Slight.
Tequesta: Ta	Severe: wetness, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, corrosive.	Severe: wetness, excess humus, floods.
Terra Ceia: Tc	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, low strength.	Severe: wetness, excess humus, low strength.	Severe: wetness, excess humus, low strength.	Severe: wetness, excess humus, low strength.
Tidal swamp, mineral: TM	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Tidal swamp, organic: TO	Severe: floods, wetness, excess humus.	Severe: floods, excess humus, wetness.	Severe: floods, excess humus, wetness.	Severe: floods, excess humus, wetness.	Severe: floods, excess humus, wetness.
Torry: Tr	Severe: excess humus, wetness, floods.	Severe: excess humus, wetness, floods.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus, floods.	Severe: excess humus, wetness, floods.
Udorthents: UD	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Urban land: Ur. No ratings.					
Wabasso: Wa	Severe: cutbanks cave, wetness.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Winder: Wn	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, corrosive, wetness.	Severe: floods, wetness.

seepage and the downslope flow of effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed in sloping soils.

In some soils, loose sand or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for use as septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

In many of the soils that have moderate or severe limitations for use as septic tank absorption fields, it may be possible to install a special system to lower the seasonal water table or to increase the size of the absorption field so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted, nearly impervious soil material. They generally are designed so that the depth of the sewage is 2 to 5 feet. Impervious soil that is at least 4 feet thick is required for the lagoon floor and sides to minimize seepage and contamination of local ground water. Soils that are very high in organic-matter content and have stones and boulders are undesirable. Unless the soil has very slow permeability, contamination of local ground water is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. If the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce its capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage

TABLE 13.—*Sanitary facilities*

Soil name and map symbol	Degree and kind of limitations for—				
	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Adamsville variant: AdB	Severe: wetness	Severe: excess humus, wetness.	Severe: excess humus, seepage.	Severe: seepage	Poor: seepage, too sandy.
Anclote: An	Severe: wetness	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, seepage, too sandy.
Arents, very steep: ASF	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope, seepage.
Arents: AU No ratings for Urban land part.	Severe: wetness	Severe: wetness	Severe: too sandy.	Severe: seepage	Poor: seepage, too sandy.
Arents, organic substratum: AX No ratings for Urban land part.	Severe: wetness	Severe: excess humus, wetness.	Severe: excess humus, too sandy.	Severe: seepage	Poor: seepage, too sandy.
Basinger:					
Ba, Bc No ratings for Urban land part of Bc.	Severe: wetness	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: too sandy, seepage, wetness.
BM (both soils)	Severe: wetness, floods.	Severe: seepage, wetness, floods.	Severe: floods, too sandy, wetness.	Severe: seepage, wetness, floods.	Poor: too sandy, seepage, wetness.
Beaches: Bn. No ratings.					
Boca: Bo	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, seepage.	Severe: wetness	Poor: too sandy, seepage, wetness.
Canaveral: Cc No ratings for Urban land part.	Severe: wetness	Severe: seepage, wetness.	Severe: too sandy, seepage, wetness.	Severe: seepage	Poor: too sandy, seepage.
Chobee: Ch	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Cocoa: CuB No ratings for Urban land part.	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage, too sandy.	Severe: seepage	Poor: too sandy, seepage.
Dania: Da	Severe: depth to rock, wetness, floods.	Severe: depth to rock, excess humus, wetness.	Severe: depth to rock, seepage, wetness.	Severe: seepage, wetness, floods.	Poor: excess humus, seepage, wetness.
Floridana: Fa	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Hallandale: Ha	Severe: depth to rock, floods, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: seepage, too sandy, wetness.
Holopaw: Ho	Severe: wetness	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, too sandy.
Immokalee: Im	Severe: wetness	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Jupiter: Ju	Severe: depth to rock, floods, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: seepage, wetness, too sandy.

TABLE 13.—*Sanitary facilities*—Continued

Soil name and map symbol	Degree and kind of limitations for—				
	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lauderhill: La	Severe: depth to rock, wetness, floods.	Severe: depth to rock, wetness, excess humus.	Severe: depth to rock, wetness, excess humus.	Severe: wetness, floods.	Poor: excess humus, seepage, wetness.
Myakka:					
Mk	Severe: wetness	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Mu No ratings for Urban land part.	Severe: wetness	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage	Poor: seepage, too sandy, wetness.
Okeechobee: Oc	Severe: wetness, floods.	Severe: wetness, seepage, excess humus.	Severe: wetness, seepage, excess humus.	Severe: wetness, seepage, floods.	Poor: excess humus, wetness.
Okeelanta: On	Severe: wetness, floods.	Severe: wetness, seepage, excess humus.	Severe: excess humus, seepage, wetness.	Severe: wetness, seepage, floods.	Poor: excess humus, seepage, wetness.
Oldsmar: Os	Severe: wetness	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: wetness	Poor: too sandy, wetness.
Pahokee: Pa	Severe: depth to rock, wetness, floods.	Severe: excess humus, seepage, wetness.	Severe: depth to rock, excess humus, wetness.	Severe: wetness, seepage, floods.	Poor: excess humus, seepage, wetness.
Palm Beach: PbB No ratings for Urban land part.	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: seepage, too sandy.
Paola: PcB	Slight	Severe: seepage	Severe: seepage, too sandy.	Severe: seepage	Poor: too sandy, seepage.
Pineda: Pd	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Fair: thin layer, seepage.
Pinellas: Pe	Severe: wetness	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: seepage, too sandy, wetness.
Pits: Pf. No ratings.					
Placid: Pg	Severe: wetness	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, too sandy, seepage.
Pomello: PhB	Severe: wetness	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: too sandy, seepage, wetness.
Pompano: Po	Severe: wetness	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, seepage, too sandy.
Quartzipsamments, shaped: QAB.	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: too sandy, seepage.
Riviera: Ra, Rd, Ru No ratings for Urban land part of Ru.	Severe: wetness	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.

TABLE 13.—*Sanitary facilities*—Continued

Soil name and map symbol	Degree and kind of limitations for—				
	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Sanibel: Sa	Severe: wetness, floods.	Severe: excess humus, seepage, wetness.	Severe: excess humus, wetness, seepage.	Severe: seepage, wetness, floods.	Poor: excess humus, seepage, wetness.
St. Lucie: ScB, SuB No ratings for Urban land part of SuB.	Slight	Severe: seepage	Severe: seepage, too sandy.	Severe: seepage	Poor: too sandy, seepage.
Tequesta: Ta	Severe: wetness, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Poor: excess humus, wetness.
Terra Ceia: Tc	Severe: wetness, floods.	Severe: wetness, excess humus, seepage.	Severe: wetness, excess humus, seepage.	Severe: wetness, excess humus, floods.	Poor: excess humus, wetness.
Tidal swamp, mineral: TM	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: seepage, too sandy, wetness.
Tidal swamp, organic: TO	Severe: floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, wetness.
Torry: Tr	Severe: wetness, floods.	Severe: excess humus, wetness, floods.	Severe: excess humus, wetness, floods.	Severe: excess humus, wetness, floods.	Poor: excess humus, hard to pack, wetness.
Udorthents: UD	Severe: slope, large stones.	Severe: slope, large stones, seepage.	Severe: slope, large stones, seepage.	Severe: slope, seepage.	Poor: slope, large stones, seepage.
Urban land: Ur. No ratings.					
Wabasso: Wa	Severe: wetness	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: too sandy, wetness.
Winder: Wn	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.

lagoons or the cost of construction. Shear strength and permeability of compacted soils affect embankments.

Sanitary landfill is a method of disposing of solid waste, either in excavated trenches or on the surface of the soil. The waste is spread, compacted in layers, and covered with thin layers of soil. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this purpose. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to bedrock and a seasonal water table, are free of large stones and boulders, and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and causes problems in excavating and filling them. Also, seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 13 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area type of sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth of bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, can be a limitation because operating heavy equipment on a wet soil is difficult.

Daily cover for sanitary landfills should be soil that is easy to excavate and spread over the compacted fill during both wet and dry weather. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils can be sticky and difficult to spread; sandy soils can be subject to soil blowing.

In addition to these features, the soils selected for final cover of landfills should be suitable for growing plants. In comparison with other horizons, the A hori-

zon in most soils has the best workability, most organic matter, and best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, the thickness of suitable soil material that is available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Formation and Classification of Soils

This section has three main parts. The first part describes the factors of soil formation as they affect soils in the Palm Beach County Area. The second part explains processes of soil formation. The third part defines the system of classifying soils and classifies the soils in the area according to that system. Terminology used in describing soils is that given in the Soil Survey Manual *(7)*.

Factors of Soil Formation

Soil is produced by forces of weathering and soil formation acting on the parent material that has been deposited or accumulated by geologic agencies. The kind of soil that develops depends on five major factors: the climate under which soil material existed since accumulation, the plant and animal life in and on the soil, the type of parent material, the relief or lay of the land, and the length of time the forces of soil formation have acted on the soil material.

The five soil forming factors are interdependent; each modifies the effect of the others. Any one of the five factors can have more influence than the others on the formation of a soil and can account for most of its properties. For example, if the parent material is quartz sand, the soil generally has only weakly expressed horizons. The effect of the parent material is modified greatly in some places by climate, relief, and plants and animals in and on the soil. As a soil forms, it is influenced by more than one of the five factors, but in some places all but one factor may have little effect. A modification or variation in any of these factors results in a different soil.

Parent material

Parent material is the unconsolidated mass from which a soil is formed. It determines the limits of the chemical and mineralogical composition of the soil. All soils in Palm Beach County Area formed in material that overlies and is influenced by four major geologic formations.

The oldest formation, the Caloosahatchee Marl, is of Pliocene age. It consists primarily of sand and varying amounts of shell, many of which are preserved unbroken. The Caloosahatchee Formation underlies the entire survey area. Although this formation is not exposed, in some places it lies close enough to the surface to be cut into by the deeper canals *(4)*.

The Ft. Thompson Formation is one of three formations of Pleistocene age that occur in the survey area. It rests uncomfortably on the Caloosahatchee marl and consists of alternating beds of limestone; shells; sand; and marl of marine, brackish, and freshwater origin. The top of each freshwater marl bed consists of hard limestone, and each is perforated by solution holes *(4)*. The Ft. Thompson Formation underlies the western two-thirds of the survey area, including Lake Okeechobee and the Everglades.

The Miami Oolite Formation consists of soft white oolitic limestone containing as much as 95 percent calcium carbonate *(4)*. The formation is highly permeable because it contains numerous vertical solution holes. The Miami Formation is of small extent in Palm Beach County Area and occurs only in the southeastern part of the survey area where it merges laterally with the Ft. Thompson and Anastasia Formations.

The Anastasia Formation underlies all of the eastern third of the survey area and presumably rests on the Caloosahatchee Formation *(4)*. It consists primarily of shell and sand cemented into a compact limestone known as coquina. The Anastasia Formation is exposed near the water line at several places along the coast. Most of the islands in Lake Worth overlie the part of the Anastasia Formation that forms the backbone of Palm Beach Island.

Pamlico sands of late Pleistocene age cover all of the survey area east of the Everglades and are the basic material from which most of the mineral soils have developed. In this part of the survey area the Pamlico Formation is a terrace that extends up to about 25 feet above sea level. Along the coastal ridge the Pamlico sands are heaped up into beach ridges and dunes at elevations higher than 25 feet.

The remaining Everglades area in the western part of the survey area is made up of organic material that has accumulated during recent times. These deposits of muck and peat, about 2 to 8 feet in thickness, directly overlie the Ft. Thompson Formation in most places. In numerous scattered areas there is a thin deposit of soft, nearly white, almost impermeable marl between the organic deposits and the Ft. Thompson Limestone. All organic soils in the survey area formed in these organic accumulations of recent origin.

Climate

The Palm Beach County Area has a tropical climate near the coast and a humid, subtropical climate west of the coastal area. The relatively high year-round temperature and the large amount of rainfall have quickened soil development. Because the abundant rainfall continuously leaches and translocates soluble minerals, most of the mineral soils contain only small amounts of organic matter and soluble plant nutrients. Only the soils that were once covered with organic material have fairly large amounts of organic matter in the surface layer. Although the climate changes from tropical to humid subtropical, it has caused few differences among the soils.

Plants and animals

Plants have been the principal biological factor in the formation of soils in the survey area; but animals, insects, bacteria, and fungi also have been important. Two of the chief functions of plant and animal life are to furnish organic matter and to bring plant nutrients from the lower to the upper horizons. Among the soil characteristics influenced by plants and animals are the differences in the amount of organic matter, nitrogen, and plant nutrients in the soils and differences in soil structure and porosity.

Relief

Relief has affected the formation of soils in the survey area, primarily through its influence on soil-water relationships. Other factors of soil formation generally associated with relief, such as erosion, temperature, and plant cover, are of minor importance.

The Palm Beach County Area is a nearly level plain with a general elevation of 0 to 25 feet except for the coastal ridge, which rises to more than 50 feet.

Three general areas are in the survey area: flatwoods, Everglades marsh, and coastal ridge. The differences in soils among these general areas are directly related to relief.

Soils in the flatwoods area have a high water table and are periodically wet to the surface; therefore they are not so highly leached as those on the coastal ridge. Soils in the Everglades marsh are covered with water for long periods of time and have a high content of organic material on the surface. Soils in the coastal ridge are at a higher elevation than soils of the flatwoods and of the Everglades areas, are mostly excessively drained or well drained, and are not influenced by a ground water table.

Time

Time is an important factor in the formation of soils. A long time generally is required for the formation of soils that have distinct horizons. The length of time that the parent material has been in place commonly is reflected in the degree of development of the soil.

Some basic minerals from which soils are formed weather fairly rapidly, and other minerals change slowly even though weathering has taken place over a long time. The translocation of fine particles within soils to form the various horizons varies under different conditions. The mineral soils in Palm Beach County Area are formed mainly from almost pure quartz sand, which is highly resistant to weathering. Some soils that are sandy throughout the profile, such as the Basinger and St. Lucie soils, have changed little from their original condition.

In terms of geologic time, the soil material that makes up the soils of the survey area is young. Because enough time has not elapsed since the material was deposited and later emerged from the sea, pronounced genetic horizons have not developed. Loamy horizons, classified as argillic horizons, occur in numerous soils such as the Riviera and Pineda soils. These horizons, however, are primarily loamy marine deposits that have been only partly altered by weathering. A distinct genetic horizon, the spodic horizon, has formed in such soils as the Myakka and Immokalee soils, but it took a relatively short time to form.

Processes of Soil Formation

Soil morphology refers to the process of forming the soil horizon, or horizon differentiation. Horizons in soils of the Palm Beach County Area differ as the result of the accumulation of organic matter, the leaching of carbonates, the reduction and transfer of iron, the accumulation of silicate clay minerals, or of more than one of these processes.

Some organic matter has accumulated in the upper layers of most of these soils to form an A1 horizon. The quantity of organic matter is small in some of the soils but fairly large in others.

Leaching of carbonates and salts has occurred in nearly all the soils. Its effects have been indirect; for example, the leaching has permitted the subsequent translocation of silicate clay material in some soils. Leaching has occurred in most soils of the survey area to varying degrees.

Iron has been reduced and transferred in most soils of the survey area except the organic soils. In some wet soils, iron has been segregated within the deeper horizons to form reddish brown mottles and concretions.

In the Riviera soil there is evidence of weathering and clay movement, or alteration, in the form of a light colored, leached A2 horizon and a loamy Bt horizon that has sand grains that are coated and bridged with clay material.

Classification of the Soils

Classification consists of an orderly grouping of soils according to a system designed to make it easier to remember soil characteristics and interrelationships. Classification is useful in organizing and applying the results of experience and research. Soils are placed in narrow classes for discussion in detailed soil surveys and for application of knowledge within farms and fields. The many thousands of narrow classes are then grouped into progressively fewer and broader classes in successively higher categories, so that information can be applied to large geographic areas.

Two systems of classifying soils have been used in the United States in recent years. The system currently used by the National Cooperative Soil Survey was developed in the early sixties and adopted in 1965 *(6)*. It is under continual study.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are observable or measurable, but the properties are selected so that soils of similar genesis are grouped together. The placement of some series in the current system of classification, particularly in families, may change as more precise information becomes available.

Table 14 shows the classification of each soil series

TABLE 14.—*Classification of the soils*

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Adamsville variant	Hyperthermic, uncoated Aquic Quartzipsamments.
Anclote	Sandy, siliceous, hyperthermic Typic Haplaquolls.
Arents.	
Arents, organic substratum.	
Arents, very steep.	
Basinger	Siliceous, hyperthermic Spodic Psammaquents.
Boca	Loamy, siliceous, hyperthermic Arenic Ochraqualfs.
Canaveral	Mixed, hyperthermic Aquic Udipsamments.
*Chobee	Fine-loamy, mixed, hyperthermic Typic Argiaquolls.
Cocoa	Sandy, siliceous, hyperthermic Psammentic Hapludalfs.
Dania	Euic, hyperthermic, shallow Lithic Medisaprists.
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls.
Hallandale	Siliceous, hyperthermic Typic Psammaquents.
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.
Immokalee	Sandy, siliceous, hyperthermic Arenic Haplaquods.
Jupiter	Sandy, siliceous, hyperthermic Typic Haplaquolls.
Lauderhill	Euic, hyperthermic Lithic Medisaprists.
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods.
Okeechobee	Euic, hyperthermic Hemic Medisaprists.
Okeelanta	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists.
Oldsmar	Sandy, siliceous, hyperthermic Alfic Arenic Haplaquods.
Pahokee	Euic, hyperthermic Lithic Medisaprists.
Palm Beach	Carbonatic, hyperthermic Typic Udipsamments.
Paola	Hyperthermic, uncoated Spodic Quartzipsamments.
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs.
Pinellas	Loamy, mixed, hyperthermic Arenic Ochraqualfs.
Placid	Sandy, siliceous, hyperthermic Typic Humaquepts.
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods.
Pompano	Siliceous, hyperthermic Typic Psammaquents.
Quartzipsamments, shaped.	
Riviera	Loamy, siliceous, hyperthermic Arenic Glossaqualfs.
Sanibel	Siliceous, hyperthermic Typic Psammaquents.
St. Lucie	Hyperthermic, uncoated Typic Quartzipsamments.
Tequesta	Loamy, siliceous, hyperthermic Arenic Glossaqualfs.
Terra Ceia	Euic, hyperthermic Typic Medisaprists.
Torry	Euic, hyperthermic Typic Medisaprists.
Udorthents	Udorthents.
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods.
Winder	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs.

of Palm Beach County Area by family, subgroup, and order, according to the current system.

Laboratory Data [3]

Particle-size distribution and selected chemical and mineralogical properties from representative soils sampled in the Palm Beach County Area are shown in tables 15, 16, and 17, respectively. These analyses were conducted and coordinated by the Soil Characterization Laboratory at the University of Florida. Detailed descriptions of the soils, including their location, are given in alphabetical order in the section "Descriptions of the Soils."

Laboratory data for other soils in the Palm Beach County Area and pedons sampled in other counties are on file in the Soil Science Department, University of Florida. Data of this nature are necessary for the proper classification of soils and for the understanding of the nature and genesis of soils.

Samples were taken from pits at carefully selected locations. Most of the analytical methods are outlines in Soil Survey Investigations Report No. 1 *(5)*. In the laboratory, samples were airdried, rolled or crushed, and sieved through a 2-millimeter screen. Particle-size distribution was determined by the hydrometer method, *(3)* using sodium hexametaphosphate dispersant. The sand fractions were separated by shaking at least 15 minutes in a dry nest of sieves. The percentage of silt was determined by difference.

Measurements of soil reaction (pH) were made by procedures 8C1a, 8C1c, and 8C1e, using a pH meter *(5)*. Extractable bases were obtained by leaching a soil sample with ammonium acetate buffered at pH 7.0 as outlined in procedure 5B1a *(5)*. Sodium (Na) and potassium (K) in the extract were then determined separately by flame spectrophotometry and calcium (Ca) and magnesium (Mg) by atomic absorption. Extractable acidity, in the past referred to as exchangeable acidity or exchangeable hydrogen, was determined by the barium chloridetriethanolamine method 6H1a *(5)*. Cation exchange capacity is calculated by summing the extractable bases and extractable acidity. Base saturation is the sum of extractable bases divided by the action exchange capacity and multiplied by 100. Organic carbon was determined by a modification of the Walkley-Black wet combustion method as outlined in procedure 6A1a *(5)*.

[3] By DR. F. G. CALHOUN, DR. V. W. CARLISLE, and DR. R. E. CALDWELL, Assistant Professor, and Professors of Soil Science, Soil Science Department, University of Florida Agricultural Experiment Stations.

TABLE 15.—*Particle-size distribution of selected soils*

[Analyzed by the Soil Characterization Laboratory, Soil Science Department, University of Florida Agricultural Experiment Station, Gainesville, Florida. Dashes indicate no determination made]

Soil series and sample number	Horizon	Depth	Particle-size distribution						
			Very coarse sand (2–1 mm)	Coarse sand (1–0.5 mm)	Medium sand (0.5–0.25 mm)	Fine sand (0.25–0.10 mm)	Very fine sand (0.10–0.05 mm)	Silt (0.05–0.002 mm)	Clay (<0.002 mm)
		In	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Anclote:									
S50–7–1	A11	0–8	0.2	6.2	28.9	52.7	4.5	3.6	3.9
S50–7–2	A12	8–17	0.2	5.4	28.9	57.8	4.8	1.4	1.5
S50–7–3	C	17–62	0.2	6.1	28.7	58.7	4.9	0.4	1.0
Basinger:									
S50–23–1	A1	0–4	—	1.5	13.2	75.1	8.6	1.2	0.4
S50–23–2	A2	4–14	0.1	2.0	12.9	75.0	8.8	0.9	0.3
S50–23–3	A2	14–25	—	2.0	13.3	75.3	8.2	0.9	0.3
S50–23–4	B1	25–29	0.1	1.7	12.7	74.4	8.4	1.1	1.6
S50–23–5	Bh	29–36	0.1	1.7	11.8	75.1	8.9	1.1	1.3
S50–23–6	C	36–44	—	1.6	12.4	76.1	7.8	1.0	1.1
S50–23–7	C	44–72	—	1.7	12.6	75.7	7.9	1.0	1.1
Boca:									
S50–24–1	Ap	0–5	0.1	3.1	39.5	51.0	1.8	2.8	1.7
S50–24–2	A21	5–12	—	3.4	41.7	51.0	2.0	1.6	0.3
S50–24–3	A22	12–29	—	4.4	43.3	49.4	1.7	1.1	0.1
S50–24–4	Btg	29–34	—	3.0	31.5	39.8	1.6	4.3	19.8
S50–24–5	IIC	34–36	0.8	4.4	24.4	28.8	2.0	13.4	26.2
Chobee:									
S50–30–1	A11	0–4	0.2	3.0	21.0	37.0	2.8	16.4	19.6
S50–30–2	A12	4–16	0.1	3.7	23.6	47.7	3.3	4.5	17.1
S50–30–3	A3	16–26	0.1	4.0	26.2	49.3	3.2	2.7	14.5
S50–30–4	B21tg	26–32	0.1	2.6	16.8	34.7	2.9	9.8	33.1
S50–30–5	B22tg	32–37	3.2	5.3	17.5	32.5	3.7	12.2	25.6
Dania:									
S50–18–1	Oa1	0–4	—	—	—	—	—	—	—
S50–18–2	Oa2	4–10	—	—	—	—	—	—	—
S50–18–3	Oa2	10–16	—	—	—	—	—	—	—
S50–18–4	IIC	16–18	0.3	12.7	52.5	31.2	1.2	0.4	1.7
Hallandale:									
S50–26–1	Ap	0–6	0.1	4.1	46.8	45.0	1.4	2.1	0.5
S50–26–2	C	6–15	—	4.1	45.5	47.6	1.8	0.7	0.3
Holopaw:									
S50–32–1	A1	0–4	0.0	1.4	24.0	70.1	1.7	1.2	1.6
S50–32–2	A21	4–14	0.0	1.9	25.0	70.2	1.3	0.7	0.9
S50–32–3	A22	14–24	0.0	2.2	23.8	70.5	2.2	0.6	0.7
S50–32–4	A23	24–42	0.0	2.2	24.1	70.7	1.5	1.2	0.3
S50–32–5	B	42–47	0.0	1.5	18.6	56.3	1.3	1.6	20.7
S50–32–6	C	47–60	0.0	2.5	23.6	62.4	2.5	0.4	8.6
Immokalee:									
S50–17–1	A11	0–4	0.1	4.2	37.9	51.4	1.1	3.5	1.8
S50–17–2	A12	4–11	0.1	5.0	41.9	50.1	0.8	1.0	1.1
S50–17–3	A21	11–18	0.2	5.0	39.8	53.3	1.0	—	0.7
S50–17–4	A22	18–37	0.2	5.3	39.1	53.9	1.0	—	0.5
S50–17–5	B1	37–45	0.2	5.8	38.5	51.3	0.9	1.3	2.0
S50–17–6	B21h	45–52	0.2	5.1	35.3	51.4	1.1	1.6	5.3
S50–17–7	B22h	52–58	0.2	5.9	36.8	50.2	1.0	0.9	5.0
S50–17–8	B23h	58–79	0.2	5.8	38.0	51.6	1.0	0.6	2.8
S50–17–9	C	79–80	0.2	5.2	30.1	62.3	0.9	0.6	0.7
Jupiter:									
S50–19–1	Ap	0–9	0.1	3.2	31.0	53.8	1.9	5.5	4.5
S50–19–2	A12	9–11	—	3.7	31.5	55.7	2.3	3.4	3.4
S50–19–3	C	11–14	—	3.8	32.1	58.4	2.2	1.3	2.2
Lauderhill:									
S50–27–1	Oap	0–8	—	—	—	—	—	—	—
S50–27–2	Oa2	8–18	—	—	—	—	—	—	—
S50–27–3	Oa3	18–26	—	—	—	—	—	—	—

TABLE 15.—*Particle-size distribution of selected soils*—Continued

Soil series and sample number	Horizon	Depth	Particle-size distribution						
			Very coarse sand (2–1 mm)	Coarse sand (1–0.5 mm)	Medium sand (0.5–0.25 mm)	Fine sand (0.25–0.10 mm)	Very fine sand (0.10–0.05 mm)	Silt (0.05–0.002 mm)	Clay (<0.002 mm)
		In	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Myakka:									
S50–1–1	A11	0–3	0.0	3.0	43.4	42.4	5.5	2.3	3.4
S50–1–2	A12	3–7	0.0	2.7	39.0	47.1	7.2	3.2	0.8
S50–1–3	A2	7–26	0.0	3.2	36.8	49.3	7.6	2.8	0.3
S50–1–4	B21h	26–31	0.1	2.8	33.3	46.7	7.8	5.7	3.6
S50–1–5	B22h	31–36	0.1	3.3	33.4	47.0	7.2	2.9	5.5
S50–1–6	B3	36–47	0.1	3.3	34.2	48.0	7.0	2.5	4.8
S50–1–7	C1	47–55	0.0	3.5	37.1	46.9	7.5	2.1	2.9
S50–1–8	C2	55–72	0.1	4.0	38.0	44.6	7.0	1.1	5.2
Okeelanta:									
S50–6–1	Oap	0–8	—	—	—	—	—	—	—
S50–6–2	Oa2	8–31	—	—	—	—	—	—	—
S50–6–3	IIC1	31–55	0.1	0.7	1.5	63.4	28.5	3.5	2.3
Oldsmar:									
S50–33–1	A1	0–8	0.0	3.9	40.5	48.9	0.7	3.9	2.1
S50–33–2	A21	8–13	0.1	5.3	41.3	49.3	3.3	0.3	0.4
S50–33–3	A22	13–26	0.1	4.8	38.3	52.1	1.2	3.5	0.0
S50–33–4	A23	26–34	0.1	5.0	37.4	52.1	3.6	1.1	0.7
S50–33–5	B2h	34–42	0.1	5.4	36.7	49.4	3.5	1.3	3.6
S50–33–6	B2t	42–46	0.0	3.4	31.1	44.8	3.3	0.9	16.5
S50–33–7	B3	46–50	0.1	4.5	35.2	45.0	2.2	0.5	12.5
Pahokee:									
S50–8–1	Oap	0–10	—	—	—	—	—	—	—
S50–8–2	Oa2	10–28	—	—	—	—	—	—	—
S50–8–3	Oa3	28–42	—	—	—	—	—	—	—
Palm Beach:									
S50–25–1	A	0–6	0.9	20.1	68.7	7.0	0.2	1.7	1.4
S50–25–2	C1	6–40	1.1	23.7	66.5	6.0	0.2	1.6	0.9
S50–25–3	C2	40–80	2.5	24.6	64.8	6.1	0.2	1.2	0.6
Paola:									
S50–21–1	A1	0–4	0.1	5.3	65.2	27.5	0.4	0.9	0.6
S50–21–2	A2	4–21	0.1	5.9	65.9	27.4	0.5	0.2	—
S50–21–3	B1	21–25	0.1	6.2	61.1	30.1	0.6	0.4	1.5
S50–21–4	B&A	25–37	0.2	7.7	61.7	28.9	0.4	0.1	1.0
S50–21–5	B3	37–80	0.2	7.8	61.6	29.3	0.4	0.1	0.6
Pineda:									
S50–10–1	A1	0–3	0.1	5.6	44.5	42.9	3.3	1.5	2.1
S50–10–2	B21ir	3–14	0.1	5.3	43.7	45.1	3.7	0.1	2.0
S50–10–3	B22ir	14–19	0.1	4.8	41.1	49.2	3.6	0.2	1.0
S50–10–4	A′2	19–34	0.1	5.8	41.2	47.2	3.8	0.6	1.3
S50–10–5	B′tg&A	34–44	0.2	7.6	43.8	33.2	1.3	0.4	13.5
Placid:									
S50–15–1	A11	0–10	0.1	4.4	34.3	51.4	0.5	6.0	3.3
S50–15–2	A12	10–17	—	4.7	40.0	51.6	0.6	1.8	1.3
S50–15–3	C1	17–23	—	5.3	37.7	55.8	0.6	0.2	0.4
S50–15–4	C2	23–60	—	5.2	36.4	57.6	0.5	0.1	0.2
Pomello:									
S50–22–1	A1	0–4	—	1.6	14.0	69.9	11.6	2.6	0.3
S50–22–2	A21	4–16	—	2.3	14.1	70.4	11.5	1.5	0.2
S50–22–3	A21	16–28	0.1	2.6	14.1	71.0	10.8	1.2	0.2
S50–22–4	A22	28–44	0.1	2.1	13.2	72.5	10.5	1.4	0.2
S50–22–5	B2h	44–54	0.1	1.8	11.8	71.5	10.2	2.8	1.8
S50–22–6	B3	54–60	0.1	1.9	11.7	72.5	10.5	2.2	1.1
S50–22–7	C	60–80	0.1	2.0	13.7	74.4	8.1	1.4	0.3
Pompano:									
S50–12–1	Ap	0–8	0.1	3.1	31.0	61.4	2.0	1.2	1.2
S50–12–2	C1	8–32	0.1	2.8	31.7	62.5	2.3	0.2	0.4
S50–12–3	C2	32–52	0.1	2.2	27.9	65.8	2.4	—	1.6
S50–12–4	C3	52–60	0.1	2.3	31.0	63.7	2.1	0.3	0.5
S50–12–5	C3	60–80	0.1	2.4	30.7	64.0	2.1	0.1	0.6

TABLE 15.—*Particle-size distribution of selected soils*—Continued

Soil series and sample number	Horizon	Depth	Particle-size distribution: Very coarse sand (2-1 mm)	Coarse sand (1-0.5 mm)	Medium sand (0.5-0.25 mm)	Fine sand (0.25-0.10 mm)	Very fine sand (0.10-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)
		In	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Riviera:									
S50-2-1	A1	0-6	0.0	4.3	43.9	45.7	3.1	2.1	0.9
S50-2-2	A2	6-28	0.0	4.1	39.5	49.7	3.8	2.8	0.1
	B&A	28-36	—	—	—	—	—	—	—
S50-2-3	B2tg	36-42	0.0	3.9	32.8	39.9	2.1	2.0	19.3
S50-2-4	IIC	42-62	—	—	—	—	—	—	—
Sanibel:									
S50-16-1	Oa	12-6	—	—	—	—	—	—	—
S50-16-2	Oa	6-0	—	—	—	—	—	—	—
S50-16-3	A11	0-3	0.1	9.3	56.3	28.3	0.6	2.4	3.0
S50-16-4	A12	3-6	0.1	9.9	58.5	28.1	0.5	0.7	2.2
S50-16-5	C1	6-20	0.1	10.6	59.0	28.6	0.5	0.7	0.5
S50-16-6	C2	20-60	0.1	9.2	53.9	35.1	0.8	0.3	0.6
St. Lucie:									
S50-20-1	A	0-5	0.3	4.3	61.4	29.6	0.4	3.2	0.8
S50-20-2	C	5-20	—	4.9	61.8	32.2	0.6	0.3	0.2
S50-20-3	C	20-40	—	5.0	59.4	34.3	0.8	0.2	0.3
S50-20-4	C	40-80	—	5.6	56.7	36.5	0.8	—	0.4
Tequesta:									
S50-28-1	Oap	12-0	—	—	—	—	—	—	—
S50-28-2	A1	0-13	0.0	1.8	22.2	71.1	2.8	0.9	1.2
S50-28-3	A2	13-32	0.0	1.3	17.7	74.0	4.8	1.1	1.1
S50-28-4	Btg&A	32-60	0.0	1.5	17.6	58.1	3.7	1.7	17.4
Terra Ceia:									
S50-4-1	Oap	0-8	—	—	—	—	—	—	—
S50-4-2	Oa2	8-65	—	—	—	—	—	—	—
Torry:									
S50-5-1	Oap	0-12	—	—	—	—	—	—	—
S50-5-2	Oa2	12-21	—	—	—	—	—	—	—
S50-5-3	Oa2	21-36	—	—	—	—	—	—	—
S50-5-4	Oa3	36-65	—	—	—	—	—	—	—
Wabasso:									
S50-13-1	A11	0-4	0.2	4.3	36.8	50.8	1.6	4.6	1.7
S50-13-2	A12	4-8	0.1	3.2	34.2	56.2	2.1	3.1	1.1
S50-13-3	A2	8-22	0.2	4.2	31.6	60.2	2.8	0.5	0.5
S50-13-4	Bh	22-32	0.1	4.6	28.3	58.4	3.1	2.2	3.3
S50-13-5	B′t	32-38	0.1	3.3	24.3	48.4	2.8	2.0	19.1
Winder:									
S50-14-1	A1	0-2	0.1	2.4	26.2	50.3	3.1	12.2	5.7
S50-14-2	A21	2-11	0.0	2.5	29.6	61.0	5.1	1.1	0.7
S50-14-3	A22	11-16	0.1	2.6	26.6	58.8	5.8	2.8	3.3
S50-14-4	B2tg&A	16-24	0.1	2.0	22.0	48.8	5.4	2.4	19.3
S50-14-5	B3&A	24-30	0.1	2.8	26.4	53.2	4.7	3.8	9.0

Clay mineral species in the clay fraction (<2mu) were identified by X-ray diffraction procedure 7A2d *(5)*. X-ray diffractogram peak intensities were measured above the baseline for Mg saturated glycerol solvated samples. Intensities for a given diffractogram were summed and normalized to provide relative quantities of the appropriate minerals at a given degree 2. The ratios of peak intensities with K saturation with or without heat treatment were used to separate those minerals with a common Mgk saturated glycerol solvated spacing. These percentage values do not indicate absolute determined quantities of soil minerals but do imply a relative distribution of minerals in a particular mineral suite.

Environmental Factors Affecting Soil Use

Soil is intimately associated with its environment. The interaction of all the soil forming factors determines the character of the soil and its overall behavior for a given use. This section discusses briefly environmental and cultural factors that affect the use and

TABLE 16.—*Chemical analyses of selected soils*

[Analyzed by the Soil Characterization Laboratory, Soil Science Department, University of Florida Agricultural Experiment Station, Gainesville, Florida. Dashes indicate no determination made]

Soil series and sample numbers	Horizon	Depth	Soil reaction			Extractable bases				Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon
			H_2O 1:1	$CaCl_2$ 0.01 *M* 1:2	KCl 1.0 *N* 1:1	Ca	Mg	Na	K				
		In	*pH*	*pH*	*pH*	*Meq per 100 g of soil*						*Pct*	*Pct*
Anclote:													
S50-7-1	A11	0-8	5.6	4.9	5.2	4.1	0.9	0.6	0.1	0.5	6.2	92	—
S50-7-2	A12	8-17	6.1	5.0	5.5	2.7	0.4	0.6	0.1	0.1	3.8	97	1.2
S50-7-3	C	17-62	(1)	(1)	(1)	0.4	0.2	0.5	(2)	0.4	1.5	73	0.1
Basinger:													
S50-23-1	A1	0-4	5.9	4.9	5.0	0.2	(2)	(2)	(2)	0.6	0.8	25	—
S50-23-2	A2	4-14	5.7	4.8	4.8	(2)	(2)	(2)	(2)	0.3	0.3	—	(2)
S50-23-3	A2	14-25	5.5	4.9	4.8	(2)	(2)	(2)	(2)	0.2	0.2	—	(2)
S50-23-4	B1	25-29	5.4	4.4	4.3	(2)	(2)	(2)	(2)	1.2	1.2	—	0.1
S50-23-5	Bh	29-36	5.3	4.6	4.4	(2)	(2)	(2)	(2)	1.7	1.7	—	0.8
S50-23-6	C	36-44	5.7	4.8	4.6	(2)	(2)	(2)	(2)	1.4	1.4	—	0.2
S50-23-7	C	44-72	6.1	5.3	5.1	0.2	(2)	(2)	(2)	0.6	0.8	25	—
Boca:													
S50-24-1	Ap	0-5	5.9	5.6	5.5	3.1	0.7	0.2	0.2	3.2	7.4	57	0.3
S50-24-2	A21	5-12	6.2	5.6	5.7	0.8	0.1	(2)	(2)	0.8	1.7	53	—
S50-24-3	A22	12-29	6.7	6.1	6.0	0.2	(2)	(2)	(2)	0.2	0.4	50	—
S50-24-4	Btg	29-34	7.3	7.1	6.7	13.3	1.2	0.2	0.4	3.6	(3)	(3)	1.3
S50-24-5	IIC	34-36	7.8	7.5	7.4	25.0	0.6	0.3	0.3	0.9	(3)	(3)	0.5
Chobee:													
S50-30-1	A11	0-4	4.2	4.0	3.8	7.4	0.2	0.1	0.1	18.1	25.9	30	8.5
S50-30-2	A12	4-16	5.4	5.1	4.8	7.9	0.4	(2)	(2)	7.2	15.5	54	2.6
S50-30-3	A3	16-26	5.7	5.3	4.9	10.0	0.4	0.1	0.1	2.1	12.7	83	0.9
S50-30-4	B21tg	26-32	8.2	7.6	7.5	22.1	0.4	0.1	(2)	1.2	(3)	(3)	0.5
S50-30-5	B22tg	32-37	8.3	7.8	7.6	20.5	0.3	0.1	0.1	0.7	(3)	(3)	0.4
Dania:													
S50-18-1	Oa1	0-4	6.3	6.1	5.9	94.8	6.3	2.2	0.8	41.4	145.5	72	44.8
S50-18-2	Oa2	4-10	6.2	6.0	5.9	75.3	4.9	3.1	0.8	45.2	129.3	65	52.7
S50-18-3	Oa2	10-16	6.6	6.5	6.4	75.0	3.7	5.2	1.1	32.1	117.1	73	50.0
S50-18-4	IIC	16-18	7.7	7.2	7.4	34.9	0.1	0.1	0.1	0.5	(3)	(3)	0.4
Hallandale:													
S50-26-1	Ap	0-6	5.7	4.8	4.8	1.2	0.1	(2)	(2)	2.1	3.4	38	0.5
S50-26-2	C	6-15	5.7	4.8	4.5	0.1	(2)	(2)	(2)	0.5	0.6	17	—
Holopaw:													
S50-32-1	A1	0-4	5.5	4.4	4.2	0.5	0.4	(2)	(2)	1.9	2.8	32	0.7
S50-32-2	A21	4-14	6.1	5.0	4.8	0.2	(2)	(2)	(2)	0.5	0.7	29	—
S50-32-3	A22	14-24	6.6	5.8	5.7	0.1	(2)	(2)	(2)	(2)	0.1	100	(2)
S50-32-4	A23	24-42	6.4	5.4	5.2	0.2	(2)	(2)	(2)	(2)	0.2	100	0.2
S50-32-5	Btg	42-47	(1)	(1)	(1)	4.5	0.3	0.1	0.1	6.3	11.3	44	0.5
S50-32-6	C	47-60	(1)	(1)	(1)	3.7	0.2	0.1	0.1	2.0	6.1	67	0.2
Immokalee:													
S50-17-1	A11	0-4	6.9	6.4	6.4	6.2	0.3	0.1	(2)	2.5	9.1	73	1.9
S50-17-2	A12	4-11	5.8	5.0	5.2	1.5	(2)	(2)	(2)	1.6	3.1	48	0.6
S50-17-3	A21	11-18	5.8	4.9	5.2	0.3	(2)	(2)	(2)	0.5	0.8	38	0.2
S50-17-4	A22	18-35	6.3	4.9	5.1	0.2	(2)	(2)	(2)	0.4	0.6	33	1.0
S50-17-5	B1	37-45	4.6	3.6	3.6	0.7	0.1	(2)	(2)	5.0	5.8	14	0.7
S50-17-6	B21h	45-52	4.3	3.5	3.4	0.8	0.1	(2)	(2)	21.8	22.7	4	2.5
S50-17-7	B22h	52-58	4.1	3.7	3.6	0.3	(2)	(2)	(2)	17.4	17.7	2	1.8
S50-17-8	B23h	58-79	4.7	4.0	3.9	0.2	(2)	(2)	(2)	7.4	7.6	3	0.7
S50-17-9	C	79-80	4.8	4.5	4.3	0.1	(2)	(2)	(2)	2.0	2.1	5	0.3
Jupiter:													
S50-19-1	Ap	0-9	6.6	6.1	7.4	12.0	0.3	0.1	0.1	5.6	18.1	69	3.4
S50-19-2	A12	9-11	6.6	6.2	5.9	9.2	(2)	(2)	0.1	3.7	13.0	72	2.2
S50-19-3	C	11-14	7.8	7.4	7.5	9.3	(2)	(2)	(2)	0.8	(3)	(3)	0.9
Lauderhill:													
S50-27-1	Oap	0-8	6.2	6.0	5.7	138.3	18.1	0.8	2.1	51.6	210.9	76	—
S50-27-2	Oa2	8-18	6.3	6.1	5.8	137.5	21.6	0.8	0.9	48.5	209.3	77	45.8
S50-27-3	Oa3	18-26	6.6	6.4	6.2	86.4	18.7	1.2	0.5	34.1	140.9	76	39.2

See footnotes at end of table.

TABLE 16.—*Chemical analyses of selected soils*—Continued

Soil series and sample numbers	Horizon	Depth	Soil reaction			Extractable bases				Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon
			H_2O 1:1	$CaCl_2$ 0.01 *M* 1:2	KCl 1.0 *N* 1:1	Ca	Mg	Na	K				
		In	*pH*	*pH*	*pH*	*Meq per 100 g of soil*						*Pct*	*Pct*
Myakka:													
S50-1-1	A11	0-3	5.0	3.8	3.6	0.8	0.4	0.1	([2])	1.3	2.6	50	2.2
S50-1-2	A12	3-7	5.3	4.0	3.7	0.3	0.3	0.1	([2])	0.9	1.6	44	0.6
S50-1-3	A2	7-26	6.2	5.7	4.7	0.3	0.2	0.1	([2])	0.1	0.7	86	([2])
S50-1-4	B21h	26-31	5.3	4.3	4.1	2.5	0.9	0.1	([2])	15.3	18.8	19	2.2
S50-1-5	B22h	31-36	5.2	4.6	4.4	2.8	0.9	0.1	0.1	12.0	15.9	25	—
S50-1-6	B3	36-47	5.5	4.8	4.6	0.9	0.4	0.1	0.1	0.4	1.9	79	0.5
S50-1-7	C1	47-55	6.0	5.4	4.9	0.9	0.4	0.1	0.1	0.2	1.7	88	0.3
S50-1-8	C2	55-72	6.3	5.5	5.0	1.5	0.4	0.1	0.1	0.2	2.3	91	0.2
Okeelanta:													
S50-6-1	Oap	0-8	5.4	4.8	4.9	66.0	8.0	2.3	2.0	4.8	83.1	94	38.2
S50-6-2	Oa2	8-31	5.7	5.3	5.3	59.1	10.4	2.5	0.7	15.5	88.2	82	37.6
S50-6-3	IIC1	31-55	6.9	6.3	6.5	4.1	0.9	0.5	0.1	0.1	5.7	98	0.9
Oldsmar:													
S50-33-1	A11	0-8	5.0	4.0	3.9	0.2	([2])	([2])	([2])	2.5	2.7	7	0.2
S50-33-2	A21	8-13	6.1	5.0	4.7	([2])	([2])	([2])	([2])	0.4	0.4	—	0.1
S50-33-3	A22	13-26	7.1	6.1	5.8	([2])	([2])	([2])	([2])	0.0	0.0	—	([2])
S50-33-4	A23	26-34	6.5	4.9	4.6	([2])	([2])	([2])	([2])	0.7	0.7	—	0.2
S50-33-5	B2h	34-42	5.2	4.4	4.0	1.6	0.3	([2])	([2])	6.6	8.5	22	1.3
S50-33-6	B2t	42-46	5.4	4.8	4.1	4.5	0.7	0.1	0.1	7.0	12.4	44	1.1
S50-33-7	B3	46-50	5.6	5.2	4.7	3.6	0.3	0.1	0.1	3.3	7.4	55	0.7
Pahokee:													
S50-8-1	Oap	0-10	6.1	6.5	5.6	107.8	24.8	2.6	0.6	0.8	136.6	99	37.6
S50-8-2	Oa2	10-28	6.5	6.1	6.0	72.4	17.8	2.7	0.9	7.7	101.5	92	38.6
S50-8-3	Oa3	28-42	6.2	5.7	5.8	54.6	17.3	2.9	1.0	8.7	84.5	90	—
Palm Beach:													
S50-25-1	A1	0-6	7.9	7.4	7.9	12.6	0.5	0.2	([2])	0.1	([3])	([3])	—
S50-25-2	C1	6-40	8.3	7.9	8.3	12.8	0.4	0.1	([2])	—	([3])	([3])	0.2
S50-25-3	C2	40-80	8.4	7.8	8.4	12.6	0.4	0.1	([2])	—	([3])	([3])	0.1
Paola:													
S50-21-1	A1	0-4	4.9	3.9	3.7	0.3	([2])	([2])	([2])	1.8	2.1	14	0.7
S50-21-2	A2	4-21	6.2	5.3	5.1	([2])	([2])	([2])	([2])	0.2	0.2	—	—
S50-21-3	B1	21-25	5.6	5.0	4.9	0.1	([2])	([2])	([2])	2.3	2.4	4	0.2
S50-21-4	B&A	25-37	6.0	5.3	5.1	0.1	([2])	([2])	([2])	1.8	1.9	5	0.1
S50-21-5	B3	37-80	6.1	5.4	5.1	0.1	([2])	([2])	([2])	1.1	1.2	8	0.1
Pineda:													
S50-10-1	A1	0-3	5.7	4.1	4.3	0.6	0.8	0.1	0.1	1.3	2.9	55	0.9
S50-10-2	B21ir	3-14	5.9	5.5	5.5	0.3	0.3	([2])	([2])	0.8	1.4	43	([2])
S50-10-3	B22ir	14-19	5.2	5.5	5.1	0.3	0.3	([2])	([2])	0.9	1.5	40	([2])
S50-10-4	A'2	19-34	5.0	4.9	4.7	0.5	0.5	([2])	([2])	1.1	2.1	48	—
S50-10-5	B'tg&A	34-44	6.3	6.3	5.5	8.3	0.2	([2])	0.1	2.2	10.8	80	—
Placid:													
S50-15-1	A11	0-10	4.6	4.1	4.0	4.1	0.5	0.3	0.1	15.0	20.0	25	6.6
S50-15-2	A12	10-17	5.1	4.3	4.3	1.4	0.2	0.1	0.1	4.5	6.3	29	1.6
S50-15-3	C1	17-23	5.7	4.7	4.9	0.2	([2])	([2])	([2])	0.5	0.7	29	1.5
S50-15-4	C2	23-60	3.8	4.0	3.9	0.1	([2])	0.1	0.1	0.5	0.8	38	—
Pomello:													
S50-22-1	A1	0-4	4.9	4.0	3.8	0.3	0.1	([2])	([2])	2.0	2.4	17	0.5
S50-22-2	A21	4-16	5.7	4.5	4.6	([2])	([2])	([2])	([2])	0.3	0.3	—	([2])
S50-22-3	A21	16-28	6.0	4.9	4.7	([2])	([2])	([2])	([2])	0.2	0.2	—	0.1
S50-22-4	A22	28-44	6.3	5.1	5.1	([2])	([2])	([2])	0.1	0.2	0.3	33	—
S50-22-5	B2h	44-54	4.7	3.9	3.8	0.1	([2])	0.1	0.1	6.8	7.1	4	0.8
S50-22-6	B3	54-60	4.8	4.3	4.1	([2])	([2])	0.1	0.1	2.9	3.1	6	0.4
S50-22-7	C	60-80	5.5	4.8	4.6	([2])	([2])	0.1	0.1	0.8	1.0	20	—

See footnotes at end of table.

TABLE 16.—*Chemical analyses of selected soils*—Continued

Soil series and sample numbers	Horizon	Depth	Soil reaction			Extractable bases				Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon
			H_2O 1:1	$CaCl_2$ 0.01 *M* 1:2	KCl 1.0 *N* 1:1	Ca	Mg	Na	K				
		In	*pH*	*pH*	*pH*	*Meq per 100 g of soil*						*Pct*	*Pct*
Pompano:													
S50-12-1	Ap	0-8	4.4	4.1	4.0	0.2	(2)	(2)	(2)	4.6	4.8	4	—
S50-12-2	C1	8-32	4.5	4.6	4.6	(2)	(2)	(2)	(2)	0.9	0.9	—	—
S50-12-3	C2	32-52	4.5	4.3	4.4	(2)	(2)	(2)	(2)	1.0	1.0	—	—
S50-12-4	C3	52-60	4.6	4.5	4.5	(2)	(2)	(2)	(2)	0.2	0.2	—	—
S50-12-5	C3	60-80	5.0	4.4	4.5	(2)	(2)	(2)	(2)	0.2	0.2	—	—
Riviera:													
S50-2-1	A1	0-6	6.0	4.2	4.7	0.3	0.3	0.5	(2)	0.2	1.3	84	0.3
S50-2-2	A2	6-28	6.6	4.2	6.1	0.3	0.2	0.5	(2)	(2)	1.1	96	(2)
	B&A	28-36	—	—	—	—	—	—	—	—	—	—	—
S50-2-3	B2tg	36-42	(1)	(1)	—	9.0	0.5	0.6	0.1	0.7	10.8	93	0.7
S50-2-4	IIC	42-62	—	—	—	—	—	—	—	—	—	—	—
Sanibel:													
S50-16-1	Oa	12-6	6.1	5.8	5.6	67.0	0.5	0.3	0.2	52.9	120.9	56	30.1
S50-16-2	Oa	6-0	6.2	5.7	5.5	27.7	0.1	0.3	0.2	28.1	56.4	50	12.4
S50-16-3	A11	0-3	6.3	5.5	5.5	4.2	(2)	0.1	0.1	5.8	10.2	43	2.0
S50-16-4	A12	3-6	6.3	5.5	5.5	2.4	(2)	(2)	(2)	2.8	5.2	46	1.0
S50-16-5	C1	6-20	6.4	5.7	5.8	0.3	(2)	(2)	(2)	0.4	0.7	43	0.2
S50-16-6	C2	20-60	6.5	5.8	5.9	0.3	(2)	(2)	(2)	0.4	0.7	43	0.2
St. Lucie:													
S50-20-1	A	0-5	4.6	4.0	3.9	1.6	0.3	0.1	0.1	5.9	8.0	26	1.7
S50-20-2	C	5-20	5.9	4.7	4.7	0.8	(2)	(2)	(2)	0.3	1.1	73	0.1
S50-20-3	C	20-40	5.8	5.1	5.0	(2)	(2)	(2)	(2)	0.1	0.1	—	—
S50-20-4	C	40-80	6.1	5.4	5.2	(2)	(2)	(2)	(2)	0.2	0.2	—	—
Tequesta:													
S50-28-1	Oap	12-0	5.2	4.9	4.6	89.1	6.7	1.5	0.7	92.4	190.4	51	39.6
S50-28-2	A1	0-13	6.8	6.3	6.4	1.3	0.1	0.1	0.1	0.9	2.5	64	0.5
S50-28-3	A2	13-32	6.7	6.2	6.3	1.0	(2)	0.1	0.1	0.7	1.9	63	—
S50-28-4	Btg&A	32-60	7.4	6.9	6.5	10.0	0.4	0.1	0.1	1.3	(3)	(3)	0.4
Terra Ceia:													
S50-4-1	Oap	0-8	5.7	5.3	5.1	68.4	15.1	2.5	3.2	3.6	92.8	96	47.8
S50-4-2	Oa2	8-65	6.3	5.8	5.7	50.8	19.3	3.6	0.5	4.6	78.8	94	40.8
Torry:													
S50-5-1	Oap	0-30	6.4	5.6	5.4	44.8	14.7	2.5	1.2	3.2	66.4	95	16.8
S50-5-2	Oa2	12-21	6.8	6.4	6.0	47.4	22.0	3.2	0.2	0.9	73.7	99	22.9
S50-5-3	Oa2	21-36	5.4	6.1	5.7	43.6	19.1	3.1	0.2	1.7	67.7	97	—
S50-5-4	Oa3	36-65	5.5	5.4	5.1	36.8	18.0	3.1	0.4	38.8	97.1	60	37.4
Wabasso:													
S50-13-1	A11	0-4	3.9	3.1	2.9	0.4	0.2	0.1	(2)	7.7	8.4	8	—
S50-13-2	A12	4-8	3.8	3.0	3.0	0.2	0.1	0.1	(2)	4.8	5.2	8	—
S50-13-3	A2	8-22	4.2	3.7	3.8	(2)	(2)	(2)	(2)	0.1	0.1	—	—
S50-13-4	Bh	22-32	5.2	4.5	4.5	6.4	0.2	(2)	(2)	7.9	14.5	46	—
S50-13-5	B′t	32-38	6.3	5.9	5.5	18.1	0.3	0.1	(2)	7.4	25.9	71	—
Winder:													
S50-14-1	A1	0-2	6.3	5.9	5.6	13.1	0.3	0.2	0.2	7.1	20.9	66	—
S50-14-2	A21	2-11	6.8	6.1	6.3	0.9	(2)	(2)	(2)	0.5	1.4	64	0.3
S50-14-3	A22	11-16	7.3	6.7	6.3	3.0	0.2	0.1	(2)	1.1	(3)	(3)	0.2
S50-14-4	Btg&A	16-24	7.2	6.8	6.1	13.4	0.7	0.1	0.1	4.7	(3)	(3)	—
S50-14-5	B3&A	24-30	7.9	7.6	7.2	9.7	0.2	0.1	0.1	2.4	(3)	(3)	0.2

[1] Determined on air-dry sample containing small quantities of sulfates that resulted in lower pH values than normally found under field conditions.
[2] Trace.
[3] Free calcium carbonates present.

TABLE 17.—*Clay mineral composition of selected soils*

Soil series and sample number	Horizon	Depth	Percentage of clay minerals								
			Montmorillonite	14Å Intergrade	Kaolinite	Gibbsite	Quartz	Sepiolite	Feldspar	Calcite	Cristobalite
		In									
Basinger:											
S50-23-4	B1	25–29	0	19	18	5	58	0	0	0	0
S50-23-5	Bh	29–36	53	0	0	0	16	26	5	0	0
Boca:											
S50-24-3	A22	30–74	20	30	10	8	32	0	0	0	0
S50-24-4	Btg	29–34	10	20	37	15	18	0	0	0	0
S50-24-5	IIC	34–36	11	13	15	6	4	0	0	51	0
Chobee:											
S50-30-4	B21tg	26–32	60	0	0	0	2	0	0	30	8
S50-30-5	B22tg	32–37	45	0	0	0	2	0	0	48	5
Dania:											
S50-18-4	IIC	16–18	0	70	0	0	0	30	0	0	0
Hallandale:											
S50-26-2	C	6–15	0	28	26	17	29	0	0	0	—
Holopaw:											
S50-32-6	C	47–60	30	15	50	0	5	0	0	0	0
Immokalee:											
S50-17-1	A11	0–4	0	5	15	0	80	0	0	0	0
S50-17-5	B1h	37–45	0	17	15	0	61	7	0	0	0
S50-17-6	B21h	45–52	0	46	14	5	35	0	0	0	0
S50-17-7	B22h	52–58	9	48	6	9	28	0	0	0	0
S50-17-8	B23h	58–79	0	53	11	21	15	0	0	0	0
Jupiter:											
S50-19-1	Ap	0–9	0	30	30	0	40	0	0	0	0
S50-19-3	C	11–14	0	19	15	0	20	0	0	46	0
Myakka:											
S50-1-1	A11	0–3	0	25	16	0	60	0	0	0	—
S50-1-8	C2	55–72	0	24	41	28	6	0	0	0	0
Oldsmar:											
S50-33-6	B2t	42–46	10	34	33	10	13	0	0	0	0
Paola:											
S50-10-3	B1	21–25	6	17	18	19	40	0	0	0	0
Pineda:											
S50-10-2	B21ir	3–14	0	24	15	0	61	0	0	0	0
S50-10-5	B′tg&A	34–44	0	47	35	14	4	0	0	0	0
Placid:											
S50-15-1	A11	0–10	0	0	5	0	95	0	0	0	0
S50-15-2	A12	10–17	0	30	28	0	42	0	0	0	0
Pomello:											
S50-22-4	A22	28–44	2	34	11	8	39	6	0	0	0
S50-22-5	B2h	44–54	6	30	23	6	35	0	0	0	0
S50-22-6	B3	54–60	7	33	20	7	33	0	0	0	0
Pompano:											
S50-12-1	Ap	0–8	11	26	14	11	38	0	0	0	0
S50-12-2	C1	8–32	5	44	15	4	32	0	0	0	0
S50-12-3	C2	32–52	2	42	18	5	33	0	0	0	0
S50-12-4	C3	52–60	2	41	10	9	38	0	0	0	0
S50-12-5	C3	60–80	3	55	15	7	20	0	0	0	0
Riviera:											
S50-2-3	B2tg	36–42	0	57	29	14	0	0	0	0	0

TABLE 17.—*Clay mineral composition of selected soils*—Continued

Soil series and sample number	Horizon	Depth	Percentage of clay minerals								
			Montmorillonite	14A° Intergrade	Kaolinite	Gibbsite	Quartz	Sepiolite	Feldspar	Calcite	Cristobalite
Tequesta:											
S50-28-2	A1	0-13	0	0	0	0	100	0	0	0	0
S50-28-3	A2	13-32	3	16	22	9	43	7	0	0	0
S50-28-4	Btg&A	32-60	41	30	22	0	6	1	0	0	—
Wabasso:											
S50-13-1	A11	0-4	0	0	0	0	100	0	0	0	0
S50-13-2	A12	4-8	0	0	0	0	100	0	0	0	0
S50-13-3	A2	8-22	6	1	6	0	87	0	0	0	0
S50-13-4	Bh	22-32	9	19	13	7	52	0	0	0	0
S50-13-5	B't	32-38	1	61	30	0	8	0	0	0	—
Winder:											
S50-14-4	B2tg&A	16-24	84	0	16	0	0	0	0	0	0
S50-14-5	B3&A	24-30	80	0	11	0	8	0	1	0	0

management of soils in Palm Beach County Area, such as climate, transportation, markets and farming, water supply and natural resources, and physiography and drainage.

Transportation

Palm Beach County Area is served by several major highways. U.S. Highway No. 1 is in the eastern part of the survey area, parallel to the coast. U.S. Highway No. 27 enters the survey area south of Lake Okeechobee and angles southeasterly across the Everglades to Broward County. U.S. Highways No. 441 and 98 cross the survey area in similar fashion from Lake Okeechobee to the east coast. Highway 98 terminates at West Palm Beach, and Highway 441 turns southward to Broward County. The Sunshine State Parkway, also called Florida's Turnpike, is a north-south toll road a few miles inland from the coast. I-95, soon to be completed, is between and roughly parallel to U.S. Highway No. 1 and the Parkway. Palm Beach County Area has numerous other State and county roads, especially in the coastal area. The most important one is State Road 80, which connects West Palm Beach with Ft. Myers on the west coast of Florida.

Rail Service is provided by Florida East Coast Railway and Seaboard Coast Line Railroad that generally run north-south along the east coast and provide rail service from the Lake Okeechobee area to the north.

Transportation by water is confined to freight shipping from the port of Palm Beach.

Six airports are available for use: Palm Beach International Airport, Lantana Airport, Boca Raton Airport, Palm Beach Gardens Airport, Belle Glade Airport, and Pahokee Airport. Only Palm Beach International Airport schedules commercial airline flights. The other airports are used mostly for private planes.

Farming

Palm Beach County Area is one of the few places in the United States that has either a tropical or a humid, subtropical climate. A large percentage of the mineral soils are nearly level, poorly drained, and not fertile. The more extensive organic soils are nearly level and very poorly drained, but are relatively fertile. If all these soils are drained and properly fertilized, and with the benefit from the favorable prevailing climate, they will produce good yields of winter truck crops.

Little farming was done in Palm Beach County Area prior to the establishment of the Everglades Drainage District in 1907, and until the 1940's most farms were within 6 miles of Lake Okeechobee. By the mid 1920's, vegetable farming in the Everglades was fairly extensive. In the late 1920's limited planting of sugarcane began. These two crops prevailed until the early 1950's, when a significant area of pasture was developed. In 1960 when sugar imports from Cuba ceased, acreage of sugarcane rapidly increased to a total of 240,000 acres in 1973.

Sugarcane production is the main agricultural pursuit in Palm Beach County Area. The survey area produces over 90 percent of Florida's sugar. Seven sugar mills, producing raw sugar and molasses, are located in this area.

Fresh vegetables are marketed in several ways. Tomatoes and sweet corn are packed and shipped by commercial packing companies. Most other vegetables from the coastal areas are marketed at the Pompano Farmers' Market in Broward County. All fresh vegetables from the Everglades and some from the coast are marketed at Pahokee and Belle Glade. There are no citrus processing plants in Palm Beach County Area, so all citrus, except that marketed as fresh fruit, is shipped to other counties for processing.

Estimates project that within the next 10 to 12 years most remaining undeveloped muck land will be put to farming use. Estimates on farming in the eastern sandland areas indicate that acreage of vegetable crops and pastureland will continue to diminish rapidly, but acreage of citrus will remain about the same.

Climate [4]

The climate of Palm Beach County Area is characterized by long, warm, and humid summers and mild winters. The moderating influence of the waters of the Atlantic on maximum temperatures in summer and minimum temperatures in winter is quite strong along the immediate coast but diminishes noticeably a few miles inland.

Rainfall also has a much greater variation in an east-west direction than in a north-south direction. Precipitation occurs during all seasons, but, on the basis of mean monthly totals of precipitation, a rainy season of 5 months from June through October brings nearly 65 percent of the annual rainfall to the West Palm Beach area near the coast and about 70 percent to Belle Glade and surrounding areas near Lake Okeechobee. The start of the rainy season varies considerably, sometimes beginning as early as May or as late as June. Late October usually marks the end of the wet season. A relatively dry season of 6 months, from November through April, produces only about 23 percent of the annual total at Belle Glade and only about 27 percent at West Palm Beach. Average annual rainfall is about 62 inches along the coastal sections, increases to nearly 68 inches a few miles inland at Loxahatchee, and then diminishes to around 59 inches further inland at Canal Point and Belle Glade.

The moist, unstable air in the survey area results in frequent, short showers. Thunderstorms are frequent during the summer, occur about every other day. They are sometimes heavy; 2 or 3 inches of rain can fall within 1 or 2 hours. Day-long rains in summer are rare, but when they occur, they generally are part of a tropical storm. Winter and spring rains generally are not so intense as the summer thundershowers. Rainfall in excess of 10 inches during a 24-hour period can be expected at some time during the year in about 1 year in 25. The fall rainfall includes heavy rains that accompany the passage of occasional tropical disturbances that sometimes pass as hurricanes, which are accompanied by high winds. The most severe disturbance to pass through West Palm Beach in recent years occurred on August 26, 1949, when the wind velocity is estimated to have reached 140 m.p.h.

Hail falls occasionally in thunderstorms, but it is generally small and seldom causes much damage. Snow is unknown in Palm Beach County Area.

Cold continental air must either travel over water or flow down the Florida Peninsula to reach Palm Beach County Area. In either case, its cold temperature is appreciably modified. The lowest temperature is experienced on the second or third night after the arrival of the cold air. The frequency of temperatures as low as freezing is about once every 3 years at West Palm Beach, but in farm lands farther from the coast, the frequency of light freezes is considerably higher. Freeze data shown in table 18, taken at the Belle Glade Experiment Station, is most representative of the farming area.

Summer temperatures are tempered by the ocean breeze and by the frequent formation of cumulus clouds, which shade the land somewhat but do not completely obscure the sun. Temperatures of 89° F or higher have occurred in all months of the year, but 100° has been reached only once. August is the warmest month, having an average maximum temperature of about 91°. The occurrence of 90° temperatures in August is so common that it can be expected on more than two-thirds of the days but temperatures as high as 96° are so rare that they average less then 2 days in August.

Temperature and precipitation data representative of the coastal area are shown in table 19. Table 20 gives a comparison of these data to data from other weather stations within Palm Beach County Area.

Prevailing winds are generally from an easterly direction varying from southeast to east-northeast, except in December and January, when they are from a northwesterly direction. The mean wind speed for the year is 9.4 miles per hour. The lowest monthly mean wind speed, 7.4 miles per hour, occurs in August; and the highest, 10.8 miles per hour, occurs in April.

[4] This section was compiled from data and information furnished by the Director, National Climatic Center, Asheville, North Carolina, and from information synthesized from the text of the Climate section by JAMES T. BRADLEY, climatologist, in the Soil Survey of Broward County Area (adjacent to Palm Beach County), Florida.

TABLE 18.—*Freeze data*

[Data are from Belle Glade Experiment Station, West Palm Beach Area]

Freeze threshold temperature	Average date of last spring occurrence	Average date of first fall occurrence	Average number of days between dates	Years of record, spring	Number of occurrences in spring	Years of record, fall	Number of occurrences in fall
32° F	January 30	December 25	329	25	16	26	10
28° F	January 9	December 28	353	25	7	26	5
24° F	(1)	(1)	(1)	25	1	26	0
20° F	(1)	(1)	(1)	25	0	26	0

[1] Frequency of occurrence in either spring or fall is one year in 10, or less.

TABLE 19.—*Temperature and precipitation*

[Data for West Palm Beach, Palm Beach County Area, 1941–1970]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average monthly mean	Average number of days with temperature 90° F. or higher	Average monthly total	Minimum total	Maximum total	Average number of days with rainfall of— 0.10 inch or more	Average number of days with rainfall of— 0.50 inch or more
	°F	°F	°F		In	In	In		
January	75.0	55.9	65.5	0	2.60	0.22	7.92	3	2
February	76.0	56.2	66.1	0	2.60	0.29	6.88	4	2
March	79.3	60.2	69.8	(1)	3.32	0.33	11.95	5	2
April	82.9	64.9	73.9	3	3.51	0.04	18.26	7	3
May	86.1	68.9	77.5	4	5.17	0.39	14.10	8	3
June	88.3	72.7	80.5	7	8.14	1.07	17.91	10	4
July	89.6	74.1	81.9	15	6.52	1.22	17.74	11	4
August	90.2	74.4	82.3	18	6.91	2.16	13.52	10	4
September	88.3	74.7	81.5	9	9.85	2.73	24.86	12	6
October	84.3	70.1	77.2	2	8.75	1.20	18.74	10	5
November	79.5	62.5	71.0	0	2.48	0.23	10.77	5	1
December	76.1	57.4	66.8	0	2.21	0.06	8.73	4	1
Year	83.0	66.0	74.5	59	62.06	37.31	108.64	89	37

[1] March has less than 0.5 day at 90° or higher.

TABLE 20.—*Comparison of weather records in Palm Beach County Area*

[Information extracted from U.S. Department of Commerce, NOAA, Climatography of the United States No. 86-6 Climatic Summary of the United States—Supplement for 1951 through 1960, Florida]

Station	Average annual temperature	Average number of days each year with temperature— 90° F. or higher	Average number of days each year with temperature— 32° F. or lower	Total annual precipitation	Average annual number of days each year with rainfall of— 0.10 inch or more	Average annual number of days each year with rainfall of— 0.50 inch or more
	°F			In		
Belle Glade Experiment Station	72.3	78	2	58.46	88	39
Canal Point USDA	(1)	86	(1)	59.18	83	41
Loxahatchee	73.2	114	2	67.60	96	42
West Palm Beach	75.0	23	(2)	61.93	94	37

[1] Data not available.
[2] Less than 0.5 day.

Water Supply and Natural Resources

Palm Beach County Area's surface waters are easily its most important physical asset. These waters play an important role in the economic structure of the survey area *(8)*. Other than in the lower reaches of the Loxahatchee River, this area has no flowing streams. It does, however have an abundance of surface water that includes more than one-third of Lake Okeechobee; Lakes Mangonia, Clear, Osborne, and Ida, just west of the coastal ridge; and an extensive network of canals.

Overall management of this surface water is the responsibility of the Central and Southern Florida Flood Control District. Important components of the water management system in Palm Beach County Area are Lake Okeechobee, the network of major and minor canals, and the pumps and control structures *(9)*. The system is used to prevent flood damage, provide drainage, control ground water levels, distribute water for irrigation, and store water.

The water supply for most cities in Palm Beach County Area comes from municipal wells located in the cities. West Palm Beach uses surface water from Clear Lake Mangonia that are recharged from the Water Catchment Area, which is owned by the city. Belle Glade and Pahokee depend on Lake Okeechobee for their water supply.

The most important natural resource besides abundant water is the mild climate. Other natural resources are deposits of shell and sand. Shell beds sufficiently thick and shallow enough to warrant excavation occur

in many places in the eastern part of the survey area. The shell is used primarily as aggregate for road building and foundation purposes. The abundant sand deposits in the survey area are used mainly for land filling.

Physiography and Drainage

Palm Beach County Area can be divided into three general parts based on physiography and soils. These are the coastal ridge in the eastern part, the sandy flatlands in the central part, and the broad Everglades marsh in the western part.

The coastal ridge area parallels the coast and extends inland 2 to 3 miles. This is the only part of the survey area that has any noticeable relief or slope. It includes Palm Beach Island and beaches, Lake Worth and the Intracoastal Waterway, and the coastal ridge itself. The elevation on the ridge ranges from about 25 to 50 feet above mean sea level and extends as much as 30 feet above adjacent flatlands. The elevation on Palm Beach Island ranges from 0 to about 25 feet above sea level. The soils consist of shelly sands that vary in thickness, slope, and drainage, according to location and position. Lake Worth and the waterway areas are only slightly above sea level and include scattered areas of mangrove swamps, which consist of both organic and mineral soils. Soils on the coastal ridge are deep, excessively drained sands. A major percent of the soils in this part of the survey area have been or are being developed for urban use.

The central flatlands lie between the coastal ridge and the Everglades. Most of this area has an elevation of 10 to 20 feet above mean sea level, but a maximum elevation of about 25 feet is near the north county line. The area consists mostly of pine and palmetto flatwoods with numerous small ponds and lesser areas of broad, grassy sloughs. The soils are predominantly nearly level, wet, and sandy and have a loamy subsoil or sandy layers that are weakly cemented with organic matter. In places the soils are underlain by limestone. In the northern part of the area, most soils are in their natural condition. Much of the remaining area has been drained and used for truck crops and pasture for many years. Urban development is now rapidly approaching this part of the sandy flatlands.

The Everglades is in the western two-thirds of Palm Beach County Area. This area is a nearly level, generally treeless, sawgrass marsh that has an elevation of only about 14 to 16 feet above sea level. The soils are organic and are underlain by limestone at a depth that ranges from 2 to 8 feet but generally is about 4 to 5 feet. Under natural conditions, water stands on the surface for months, and only during extremely dry seasons is the surface exposed. Today, however, these soils have been drained, and water stands on the surface for only a short time. Having been drained, the organic soils are subject to oxidation and subsidence. Although initial subsidence is rapid and brief, the soil continues to subside at the rate of about 1 inch per year because of oxidation. Since land use, or cover, has little effect on the subsidence rate of drained, organic soils, the best way to slow the rate is to maintain the highest water table possible for all uses. Except for those in undeveloped areas in the southwestern corner of the survey area, most of the organic soils in the Everglades are used for sugarcane, winter vegetables, and pasture.

Drainage in Palm Beach County Area is provided by both major and minor drainage systems. Parts of the major system are the West Palm Beach Canal, the Hillsboro Canal, the North New River Canal, and Miami Canal, all of which tie Lake Okeechobee with the east coast. Ocean Canal and Bolles Canal link the four major canals. The minor systems that included numerous smaller canals and drainage districts are interconnected with the major system under the control of the Central and Southern Florida Flood Control District.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flatwoods. Broad, nearly level, low ridges of poorly drained to dominantly sandy soils with weakly cemented subsoil having characteristic vegetation of open forest of pines and ground cover of sawpalmetto and pineland threeawn.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrophytic. Description of a plant growing in water or very moist ground.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Marl. An earthy, unconsolidated deposit formed in freshwater lakes that consists chiefly of calcium carbonate mixed with various amounts of clay or other impurities.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; the contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Porous. Full of pores; permeable by water and air.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock outcrop. Surface exposure of underlying rock strata.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: very coarse sand (2.0 millimeter); medium sand (0.5 to 0.25 millimeter); fine sand (0.25 to 0.10 millimeter); very fine sand (0.10 to 0.05 millimeter); silt (0.005 to 0.002 millimeter); and clay (less than 0.002 millimeter).

Solution hole. A closed depression or sinkhole produced by the dissolution or solution of calcium carbonate in surface material, or resulting from the settlement of the surface through the removal in solution of underlying material.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Swale. Low place in a tract of land, usually more moist and often having ranker vegetation than the adjacent higher land.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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TABLE 1.--Soil ratings, limitations, and features affecting uses, by soil association[1]--Palm Beach County Area, Florida

[A rating of slight indicates few or no limitations or that limitations are easily overcome; moderate indicates that limitations need to be recognized but can be overcome under good management and careful design; severe indicates limitations serious enough to make use questionable. Ratings of good, fair, and poor have similar meanings]

Name of association and component soils[2]	Percent of association[3]	Rating and kind of limitation for-- Sanitary facilities: Septic tank absorption field	Sewage lagoon area	Trench--sanitary landfill	Area--sanitary landfill	Daily cover for landfill	Building site development: Shallow excavations	Dwellings without basement	Dwellings with basement	Small commercial buildings[6]	Roads and streets	Recreation[5]	Construction materials[4]: Roadfill	Sand	Topsoil	Water management: Limitations for--: Pond reservoir area	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting--: Drainage	Irrigation
1. St. Lucie, Urban land-Paola (3 percent)		Slight	Severe	Severe	Severe	Poor	Severe	Slight	Slight	Moderate	Slight	Severe	Good	Good	Poor	Severe	Severe	Severe	Not needed	Droughty.
St. Lucie, Urban land	58	Slight[7]	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage	Severe: cutbanks cave.	Slight	Slight	Moderate[8]: slope.	Slight	Severe: too sandy.	Good	Good	Poor: too sandy.	Severe: too sandy	Severe: seepage, piping, unstable fill.	Severe: no water.	Not needed	Droughty, too sandy, fast intake.
Paola	7	Slight[7]	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.	Severe: cutbanks cave.	Slight	Slight	Moderate[8]: slope.	Slight	Severe: too sandy.	Good	Good	Poor: too sandy.	Severe: seepage.	Severe: seepage, piping, unstable fill.	Severe: no water.	Not needed	Droughty, too sandy, fast intake.
Others	35																			
2. Palm Beach, Urban land-Canaveral (1 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Moderate	Severe	Fair	Good	Poor	Severe	Severe	Severe	Cutbanks cave.	Droughty.
Palm Beach, Urban land	16	Slight	Severe: seepage.	Severe: seepage	Severe: seepage.	Poor: seepage, too sandy.	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: too sandy.	Good	Good	Poor: too sandy.	Severe: seepage.	Severe: seepage, piping, unstable	Severe: no water	Not needed	Droughty, fast intake.
Canaveral	16	Severe: wetness	Severe: seepage, wetness.	Severe: too sandy, seepage, wetness.	Severe: seepage.	Poor: too sandy, seepage.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: too sandy.	Fair: wetness.	Good	Poor: too sandy.	Severe: seepage.	Severe: seepage, piping, unstable fill.	Moderate: deep to water.	Cutbanks cave, wetness	Droughty, fast intake.
Others	68																			
3. Quartzipsamments-Urban land (1 percent)		Slight	Severe	Severe	Severe	Poor	Severe	Slight	Slight	Moderate	Slight	Severe	Good	Good	Poor	Severe	Severe	Severe	Not needed	Droughty.
Quartzipsamments	45	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy, seepage.	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: too sandy.	Good	Good	Poor: too sandy.	Severe: seepage.	Severe: seepage, piping, erodes easily.	Severe: no water.	Not needed	Droughty, too sandy.
Urban land	45																			
Others	10																			
4. Pomello-Immokalee (1 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Moderate	Severe	Moderate	Slight	Severe	Good	Fair	Poor	Severe	Severe	Moderate	Not needed	Fast intake.
Pomello	50	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: corrosive, slope, wetness.	Slight	Severe: too sandy.	Good	Fair: excess fines.	Poor: too sandy.	Severe: seepage.	Severe: seepage, piping, unstable fill.	Moderate: deep to water.	Not needed	Fast intake.
Immokalee	25	Severe: wetness.	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Wetness.
Others	25																			
5. Myakka-Immokalee-Basinger (8 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Fair	Poor	Severe	Severe	Moderate	Cutbanks cave.	Wetness.
Myakka	45	Severe: wetness.	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, erodes easily	Moderate: deep to water.	Cutbanks cave, wetness.	Wetness.
Immokalee	25	Severe: wetness.	Severe: seepage, wetness	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Wetness
Basinger	25	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, unstable fill.	Slight	Cutbanks cave, wetness.	Wetness.
Others	5																			
6. Immokalee-Urban land-Pompano-Basinger (1 percent)		Severe	Severe	Severe	Severe	Severe	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Fair	Poor	Severe	Severe	Moderate	Cutbanks cave.	Wetness.
Immokalee, Urban land	50	Severe: wetness.	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Wetness.
Pompano	25	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Good	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, erodes easily.	Slight	Cutbanks cave, wetness.	Wetness.
Basinger	20	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, unstable fill.	Slight	Cutbanks cave, wetness.	Wetness.
Others	5																			
7. Wabasso-Riviera-Oldsmar (3 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Fair	Poor	Severe	Severe	Slight	Cutbanks cave.	Wetness.
Wabasso	35	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, unstable fill.	Slight	Cutbanks cave, wetness.	Wetness.
Riviera	35	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, thin layer.	Slight	Cutbanks cave.	Wetness.
Oldsmar	25	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: wetness.	Poor: too sandy, wetness.	Severe: cutbanks cave, wetness	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: too sandy, wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Fast intake, wetness.
Others	5																			
8. Boca-Hallandale (1 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Poor	Poor	Severe	Severe	Moderate	Depth to rock.	Seepage.
Boca	60	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: wetness.	Poor: seepage, too sandy, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: corrosive, depth to rock, wetness.	Severe: wetness.	Severe: too sandy, wetness.	Poor: thin layer, wetness.	Poor: thin layer, excess fines.	Poor: too sandy, wetness.	Severe: depth to rock, seepage.	Severe: piping, thin layer, unstable fill.	Moderate: depth to rock.	Depth to rock, wetness.	Seepage, wetness.
Hallandale	35	Severe: depth to rock, floods, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: depth to rock, floods, wetness.	Severe: floods, too sandy, wetness.	Poor: thin layer, wetness.	Poor: thin layer.	Poor: too sandy, wetness.	Severe: depth to rock, seepage.	Severe: seepage, piping, unstable fill.	Severe: large stones.	Depth to rock, floods, wetness.	Rooting depth, wetness.
Others	5																			
9. Riviera (16 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Fair	Poor	Severe	Severe	Slight	Cutbanks cave.	Wetness.
Riviera	70	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines	Poor: too sandy.	Severe: seepage.	Severe: seepage, thin layer.	Slight	Cutbanks cave, wetness.	Wetness.
Others	30																			
10. Riviera-Boca (4 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Fair	Poor	Severe	Severe	Slight	Cutbanks cave.	Wetness.
Riviera	45	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy.	Severe: seepage.	Severe: seepage, thin layer.	Slight	Cutbanks cave, wetness.	Wetness.
Boca	40	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: wetness.	Poor: seepage, too sandy, wetness.	Severe: depth to rock, too sandy, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: corrosive, depth to rock, wetness.	Severe: wetness.	Severe: too sandy, wetness.	Poor: thin layer, wetness.	Poor: thin layer, excess fines.	Poor: too sandy, wetness.	Severe: depth to rock, seepage.	Severe: piping, thin layer, unstable fill.	Moderate: depth to rock.	Depth to rock.	Seepage.
Others	15																			
11. Basinger (3 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Fair	Poor	Severe	Severe	Slight	Cutbanks cave.	Wetness.
Basinger	60	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.	Fair: excess fines.	Poor: too sandy, wetness.	Severe: seepage.	Severe: seepage, piping, unstable fill.	Slight	Cutbanks cave, wetness.	Wetness.
Others	40																			
12. Winder-Tequesta (1 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Poor	Poor	Moderate	Severe	Slight	Wetness	Wetness.
Winder	40	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: corrosive, floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.	Poor: excess fines.	Poor: thin layer, wetness.	Moderate: seepage.	Slight	Slight	Floods, wetness.	Floods, wetness.
Tequesta	40	Severe: floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Poor: excess humus, wetness.	Severe: floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: corrosive, excess humus.	Severe: excess humus, floods, wetness.	Severe: floods, wetness.	Poor: excess humus, wetness.	Poor: excess humus, wetness.	Poor: wetness.	Moderate: seepage.	Severe: compressible, excess humus, seepage.	Slight	Wetness	Wetness.
Others	20																			
13. Terra Ceia (26 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Unsuited	Poor	Severe	Severe	Slight	Wetness	Wetness.
Terra Ceia	75	Severe: floods, wetness.	Severe: excess humus, seepage, wetness.	Severe: excess humus, seepage, wetness.	Severe: excess humus, floods, wetness.	Poor: excess humus, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, wetness	Poor: excess humus, low strength.	Unsuited	Poor: wetness.	Severe: excess humus, seepage.	Severe: excess humus, seepage, unstable fill.	Slight	Wetness, floods.	Wetness.
Others	25																			
14. Pahokee (27 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Unsuited	Poor	Severe	Severe	Slight	Depth to rock.	Wetness.
Pahokee	85	Severe: depth to rock, floods, wetness.	Severe: excess humus, seepage, wetness.	Severe: depth to rock, excess humus, wetness.	Severe: floods, seepage, wetness.	Poor: excess humus, seepage, wetness.	Severe: depth to rock, excess humus, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, low strength, wetness.	Severe: excess humus, wetness.	Poor: excess humus, low strength, wetness.	Unsuited	Poor: wetness.	Severe: excess humus, seepage.	Severe: excess humus, low strength, seepage.	Slight	Depth to rock, excess humus, wetness.	Wetness.
Others	15																			
15. Torry (4 percent)		Severe	Severe	Severe	Severe	Poor	Severe	Severe	Severe	Severe	Severe	Severe	Poor	Unsuited	Poor	Moderate	Severe	Slight	Poor outlets.	Wetness.
Torry	85	Severe: floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Poor: excess humus, hard to pack, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, too clayey, wetness.	Poor: excess humus, wetness.	Unsuited	Poor: wetness.	Moderate: excess humus, seepage.	Severe: excess humus.	Slight	Poor outlets, excess humus.	Wetness.
Others	15																			

1/ The overall rating for the association is based on the underlined rating for the dominant soil (soil that makes up the greatest percentage of the association) or soils if more than one soil has the same rating. The percentage of the association that the overall rating applies to can be determined from the underlined rating.

2/ "Others" represents minor soils in the association. No one of the individual minor soils makes up as large a percentage of the association as the major soil with the lowest percentage. The percentage in parentheses following each of the soil associations represents the percentage of the Palm Beach County Area covered by the association.

3/ The percentages are estimates and are not based on measured acreage.

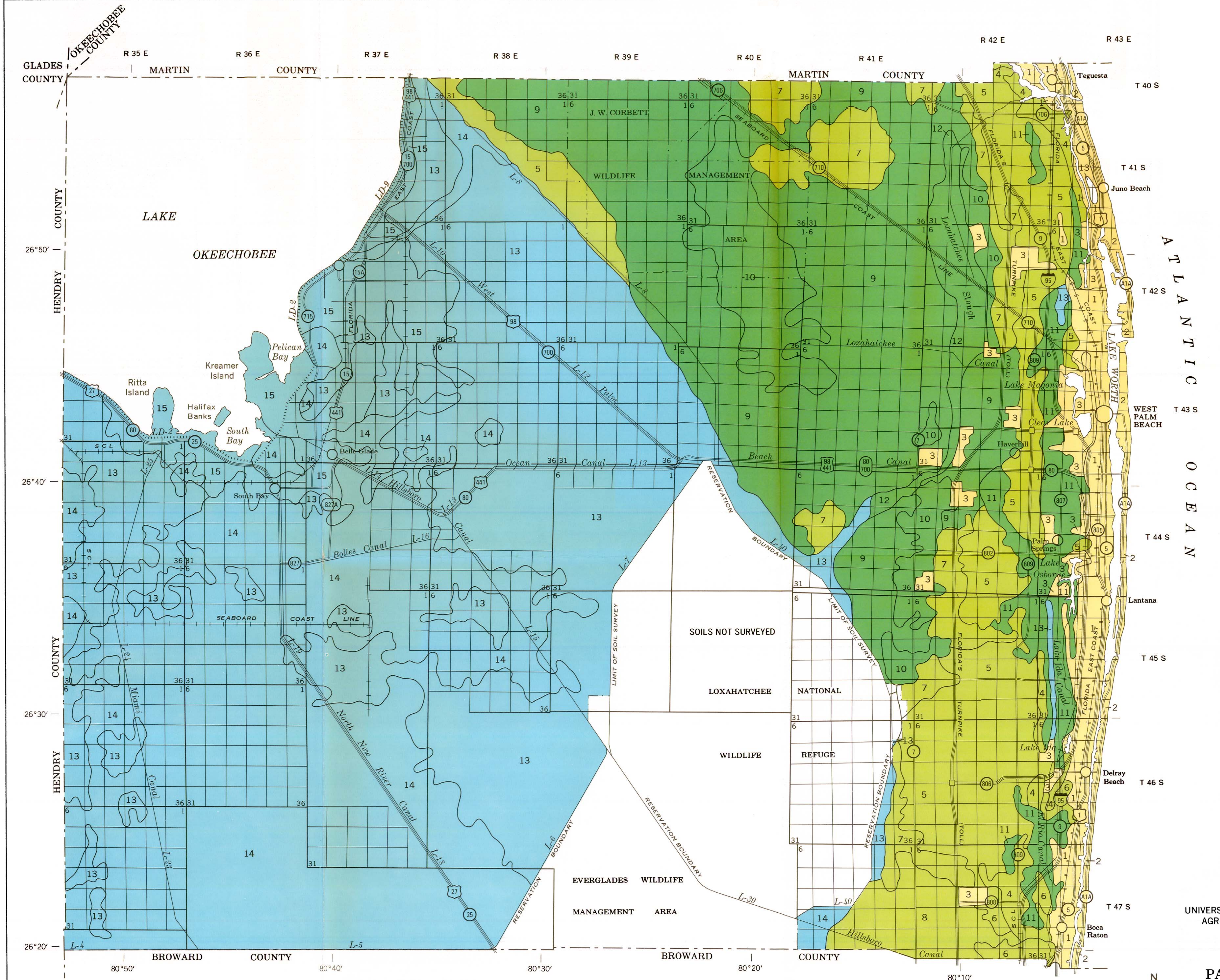
4/ All the soils are not suitable as a source of gravel.

5/ Ratings apply to camp areas, picnic areas, playgrounds, and paths and trails. For playgrounds, St. Lucie, Paola, and Canaveral soils have an additional limitation of soil blowing; Pomello soils, an additional limitation of slope; and Hallandale soils, an additional limitation of depth to rock.

6/ Where foundation requirements do not exceed those of ordinary three-story dwellings.

7/ Pollution is a hazard when lakes, ponds, streams, and water supplies are nearby because of the permeability of the absorption field.

8/ Where slopes are less than 4%, degree of limitation for small commercial buildings is slight.



SOIL ASSOCIATIONS

NEARLY LEVEL TO SLOPING, EXCESSIVELY DRAINED TO SOMEWHAT POORLY DRAINED SOILS OF THE COASTAL RIDGES

1 ST. LUCIE–URBAN LAND–PAOLA association: Nearly level to sloping, excessively drained soils that are sandy throughout; mostly in urban use.

2 PALM BEACH–URBAN LAND–CANAVERAL association: Nearly level to sloping, excessively drained, moderately well drained, and somewhat poorly drained soils that are sandy throughout; mostly in urban use.

3 QUARTZIPSAMMENTS–URBAN LAND association: Nearly level to sloping, excessively drained soils that are sandy throughout and areas in urban use.

NEARLY LEVEL TO GENTLY SLOPING, POORLY DRAINED AND MODERATELY WELL DRAINED SOILS OF THE FLATWOODS, GENERALLY NOT SUBJECT TO FLOODING

4 POMELLO–IMMOKALEE association: Nearly level to gently sloping, moderately well drained and poorly drained soils that are sandy throughout and have a weakly cemented layer below a depth of 30 inches.

5 MYAKKA–IMMOKALEE–BASINGER association: Nearly level, poorly drained soils that are sandy throughout; some have a weakly cemented layer below a depth of 30 inches.

6 IMMOKALEE–URBAN LAND–POMPANO–BASINGER association: Nearly level, poorly drained soils that are sandy throughout; some have a weakly cemented layer below a depth of 30 inches; mostly in urban use.

7 WABASSO–RIVIERA–OLDSMAR association: Nearly level, poorly drained sandy soils that have a loamy subsoil; some have a weakly cemented sandy layer over the loamy subsoil.

8 BOCA–HALLANDALE association: Nearly level, poorly drained sandy soils that are moderately deep to shallow over limestone; some have a loamy subsoil.

NEARLY LEVEL, POORLY DRAINED AND VERY POORLY DRAINED SOILS GENERALLY IN SLOUGHS AND DEPRESSIONS, SUBJECT TO FREQUENT FLOODING

9 RIVIERA association: Nearly level, poorly drained sandy soils that have a loamy subsoil.

10 RIVIERA–BOCA association: Nearly level, poorly drained sandy soils that have a loamy subsoil; some are moderately deep over limestone.

11 BASINGER association: Nearly level, poorly drained soils that are sandy throughout.

12 WINDER–TEQUESTA association: Nearly level, poorly drained and very poorly drained sandy soils that have a loamy subsoil; some have a thin layer of muck at the surface.

NEARLY LEVEL, VERY POORLY DRAINED ORGANIC SOILS OF THE EVERGLADES

13 TERRA CEIA association: Nearly level, very poorly drained, well decomposed organic soils that are more than 51 inches thick.

14 PAHOKEE association: Nearly level, very poorly drained organic soils that are 36 to 51 inches thick over limestone.

15 TORRY association: Nearly level, very poorly drained organic soils that are more than 51 inches thick over limestone.

Compiled 1976

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF FLORIDA INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES
AGRICULTURAL EXPERIMENT STATIONS, SOIL SCIENCE DEPARTMENT

GENERAL SOIL MAP

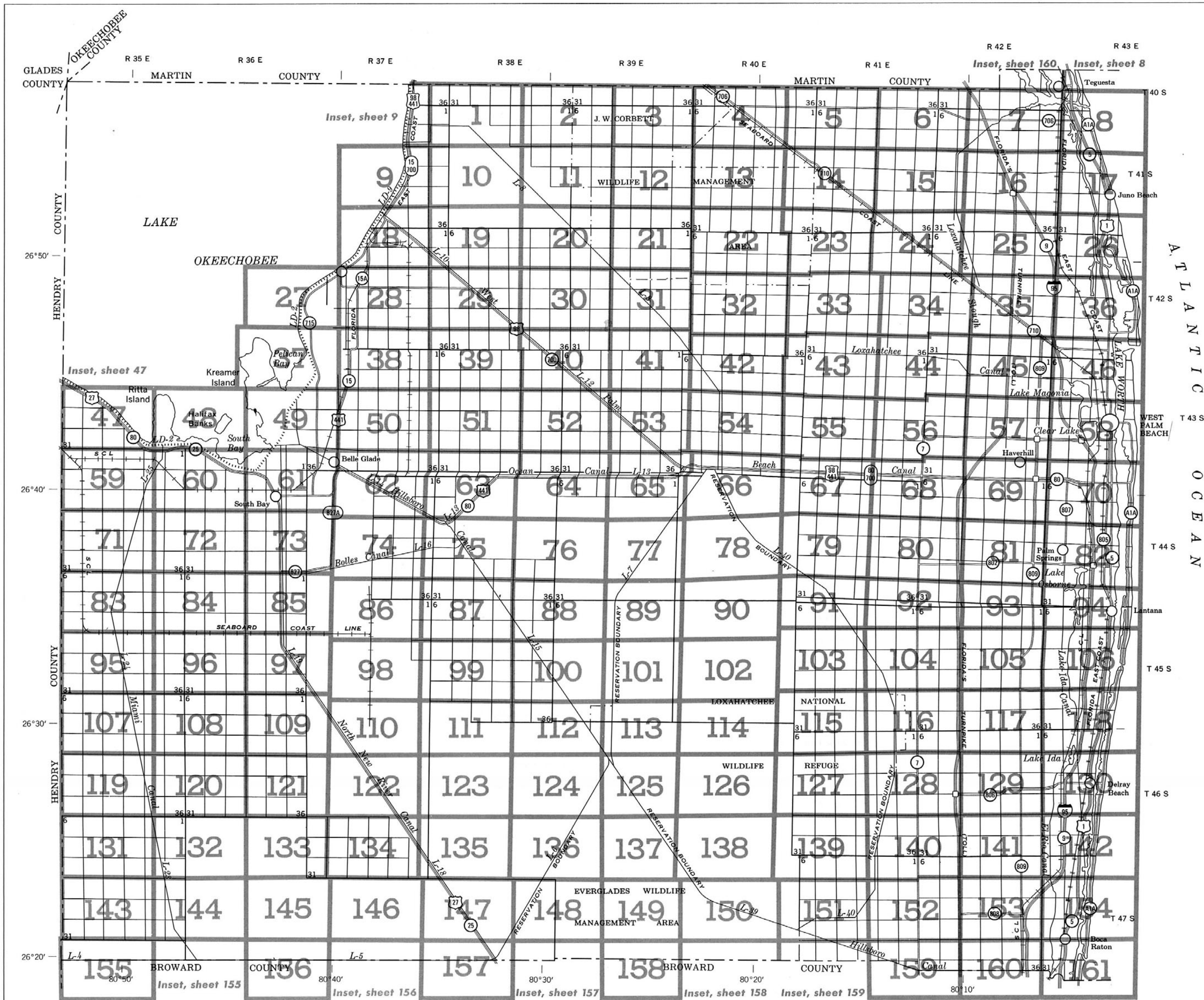
PALM BEACH COUNTY AREA, FLORIDA

Scale 1:190,080

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Original text from each map sheet:
"This map is compiled on 1970 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned."

INDEX TO MAP SHEETS

PALM BEACH COUNTY AREA, FLORIDA

Scale 1:316,800

1 0 1 2 3 4 5 Miles

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a lower case letter for a narrowly defined unit, and a capital letter for a broadly defined unit.[1/] The third position, if used, is a capital letter and connotes slope class. Most symbols without a slope letter are those for nearly level soils, but some are for land types or broadly defined units that have a considerable range in slope.

SYMBOL	NAME
AdB	Adamsville sand, organic subsoil variant
An	Anclote fine sand
ASF	Arents, very steep[1/]
AU	Arents-Urban land complex[1/]
AX	Arents-Urban land complex, organic substratum
Ba	Basinger fine sand
Bc	Basinger-Urban land complex
BM	Basinger and Myakka sands, depressional[1/]
Bn	Beaches
Bo	Boca fine sand
Cc	Canaveral-Urban land complex
Ch	Chobee fine sandy loam
CuB	Cocoa-Urban land complex
Da	Dania muck
Fa	Floridana fine sand
Ha	Hallandale sand
Ho	Holopaw fine sand
Im	Immokalee fine sand
Ju	Jupiter fine sand
La	Lauderhill muck
Mk	Myakka sand
Mu	Myakka-Urban land complex
Oc	Okeechobee muck
On	Okeelanta muck
Os	Oldsmar sand
Pa	Pahokee muck
PbB	Palm Beach-Urban land complex
PcB	Paola sand, 0 to 8 percent slopes
Pd	Pineda sand
Pe	Pinellas fine sand
Pf	Pits
Pg	Placid fine sand
PhB	Pomello fine sand
Po	Pompano fine sand
QAB	Quartzipsamments, shaped[1/]
Ra	Riviera sand
Rd	Riviera sand, depressional
Ru	Riviera-Urban land complex
Sa	Sanibel muck
ScB	St. Lucie sand, 0 to 8 percent slopes
SuB	St. Lucie-Urban land complex
Ta	Tequesta muck
Tc	Terra Ceia muck
TM	Tidal swamp, mineral[1/]
TO	Tidal swamp, organic[1/]
Tr	Torry muck
UD	Udorthents[1/]
Ur	Urban land
Wa	Wabasso fine sand
Wn	Winder fine sand

1/ The composition of these units is apt to be more variable than the other units in the survey area. Mapping has been controlled well enough, however, to be interpreted for the anticipated use of the soils.

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water; w)

PITS

- Pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (CeA; FoB2)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

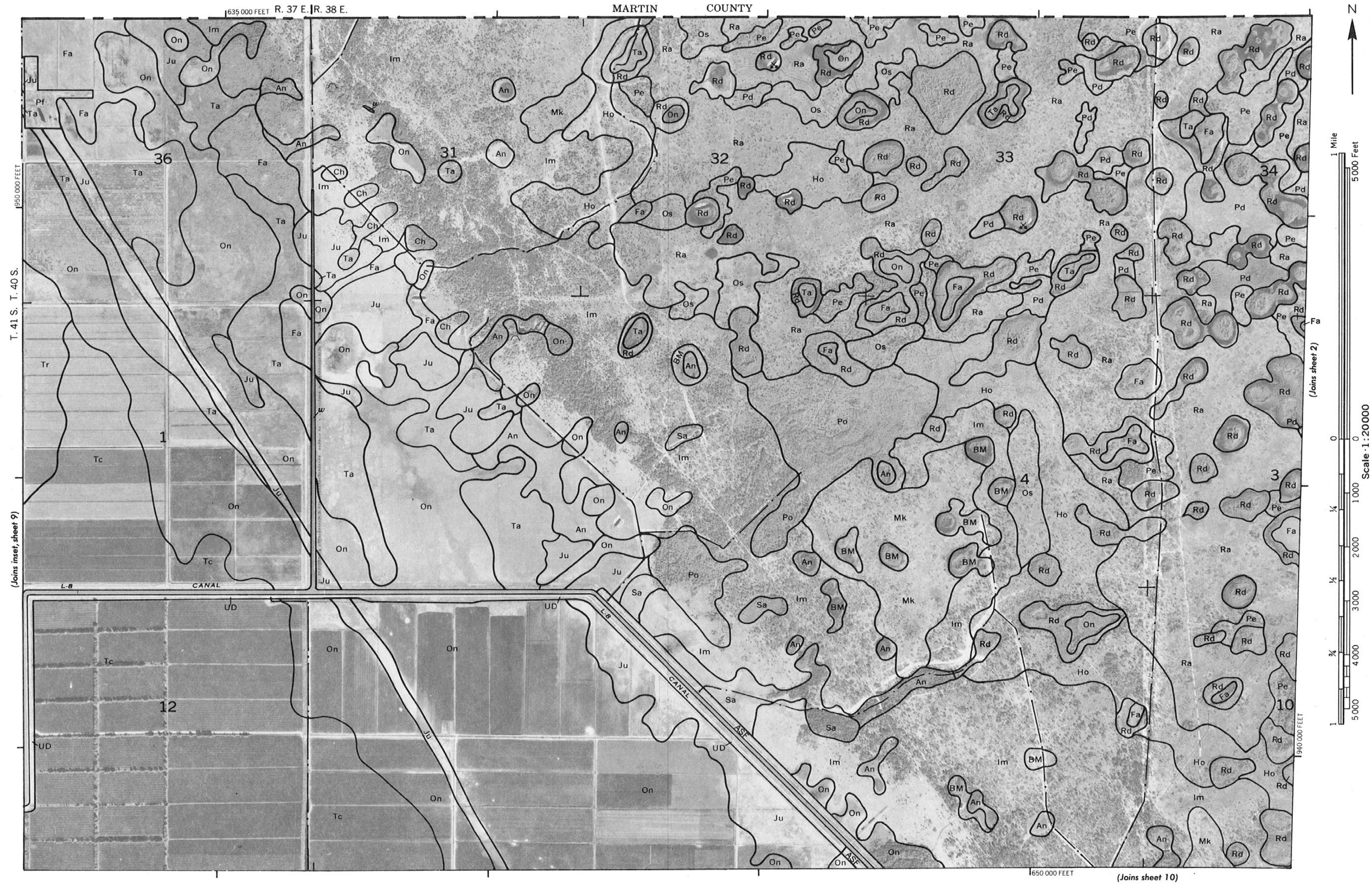
GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) (S)

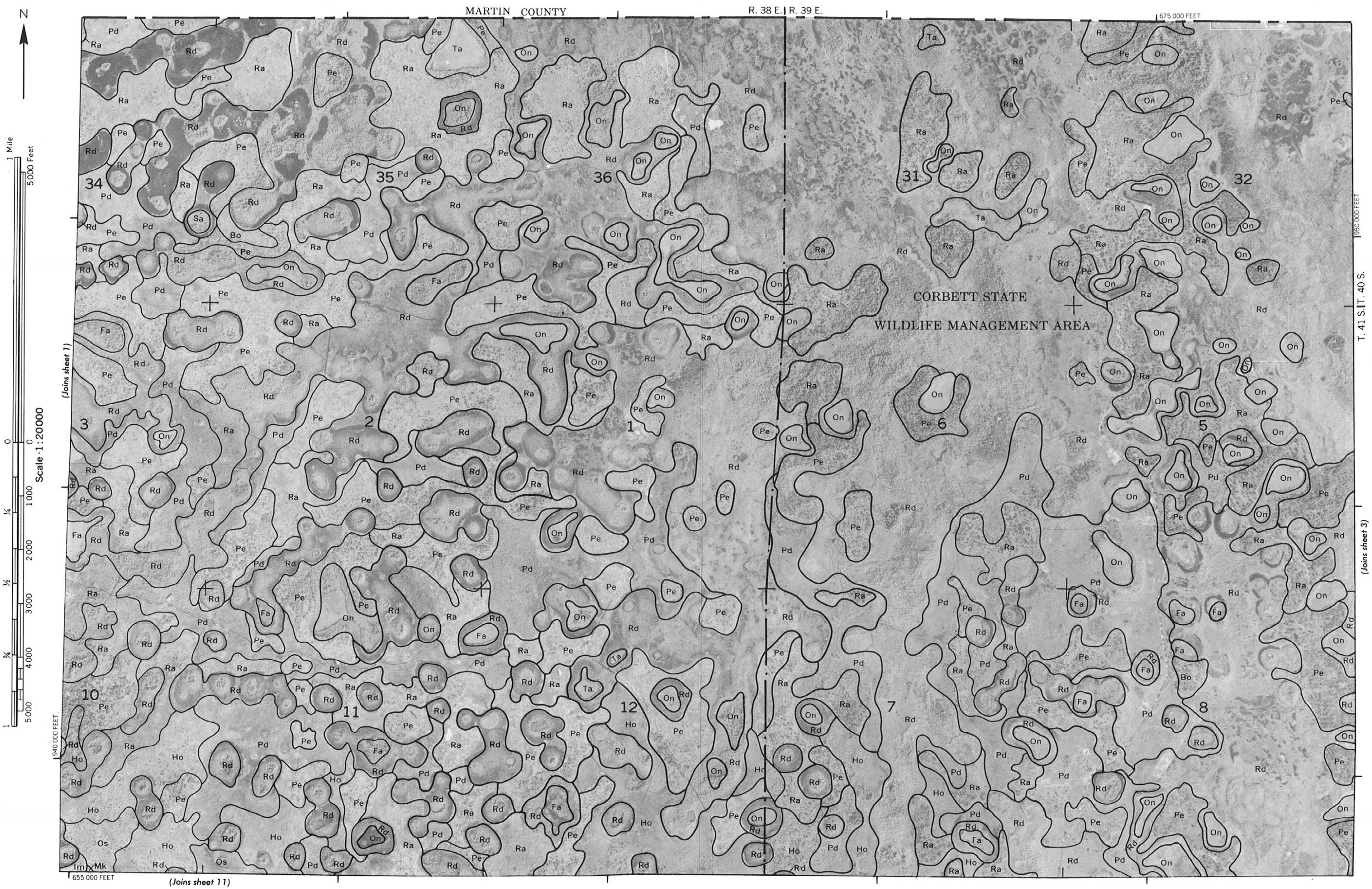
MISCELLANEOUS

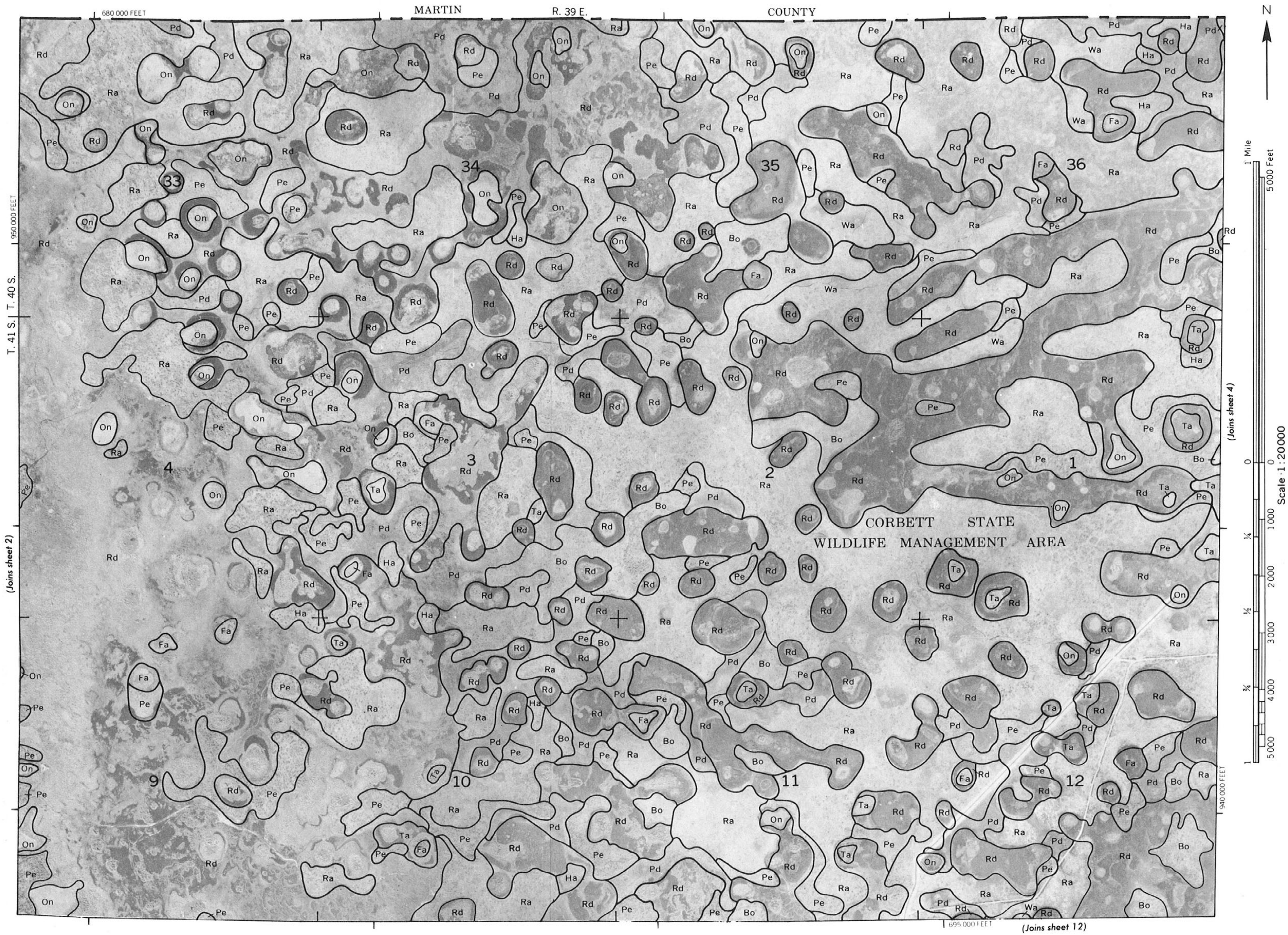
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot


MARTIN COUNTY
635 000 FEET
R. 37 E.
R. 38 E.
950 000 FEET
T. 41 S. T. 40 S.
(Joins inset, sheet 9)
(Joins sheet 2)
(Joins sheet 10)
650 000 FEET
940 000 FEET
L-8 CANAL
L-8 CANAL ASE
N
1 Mile
5000 Feet
Scale 1:20000
36
31
32
33
34
1
4
3
12
10

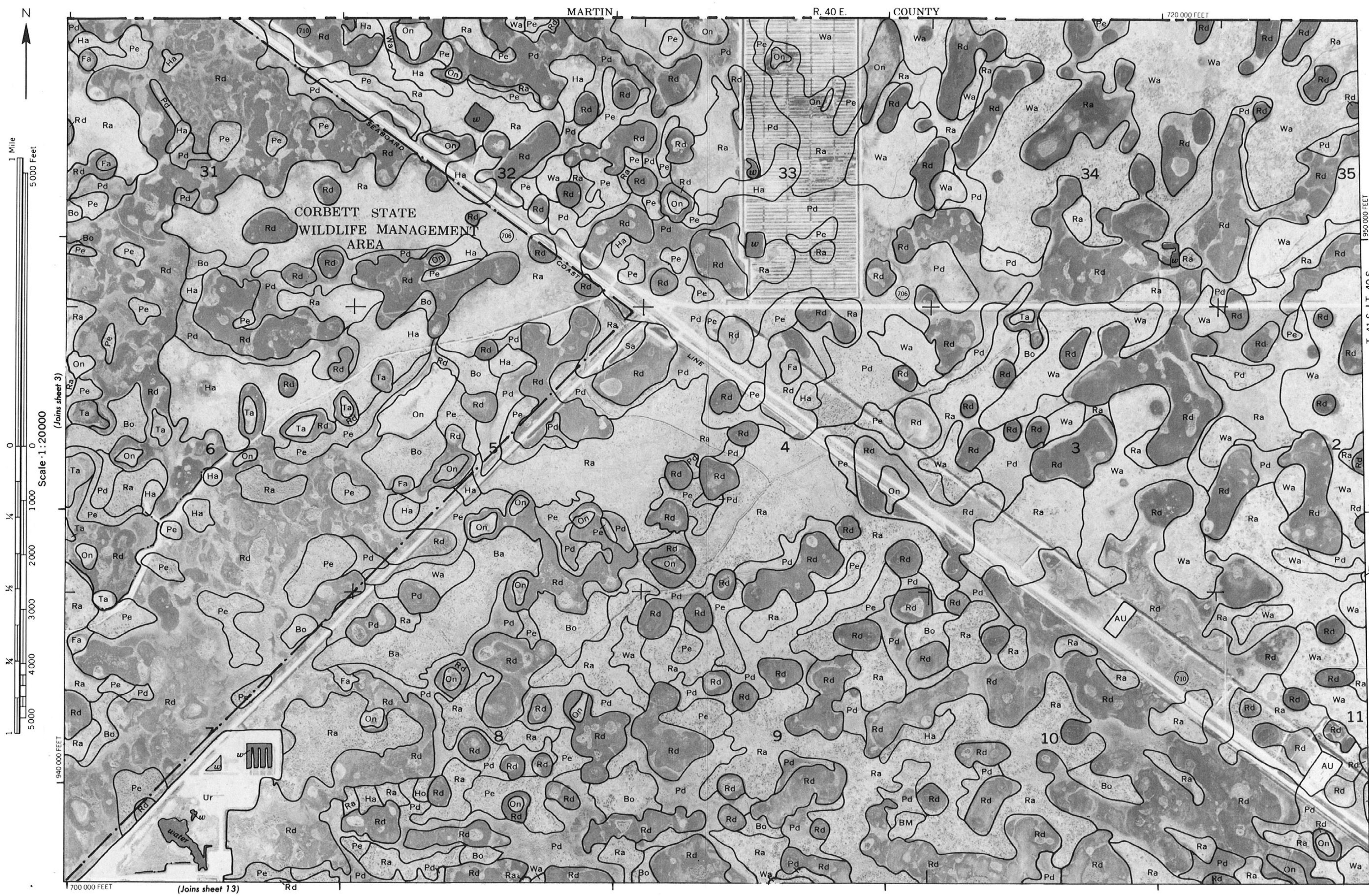
2

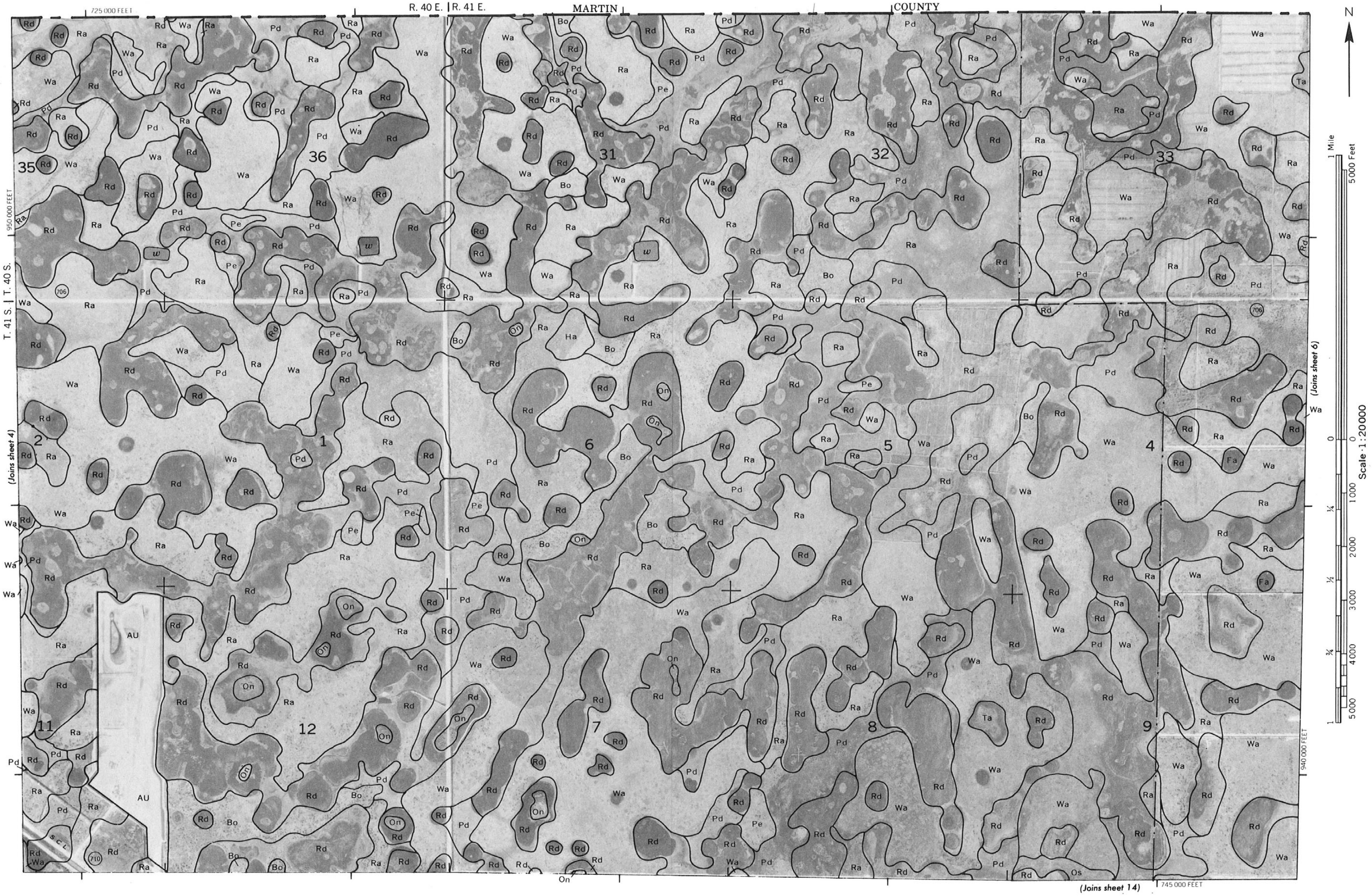
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 2




MARTIN
R. 39 E.
COUNTY
680 000 FEET
950 000 FEET
T. 40 S.
T. 41 S.
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 12)
695 000 FEET
940 000 FEET
CORBETT STATE
WILDLIFE MANAGEMENT AREA
N
1 Mile
5000 Feet
Scale 1:20000
33
34
35
36
4
3
2
1
9
10
11
12

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 4




MARTIN COUNTY
R. 40 E. | R. 41 E.
T. 40 S. | T. 41 S.
725 000 FEET
950 000 FEET
940 000 FEET
745 000 FEET
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 14)
N
1 Mile
5000 Feet
Scale 1:20000
35
36
31
32
33
2
1
6
5
4
11
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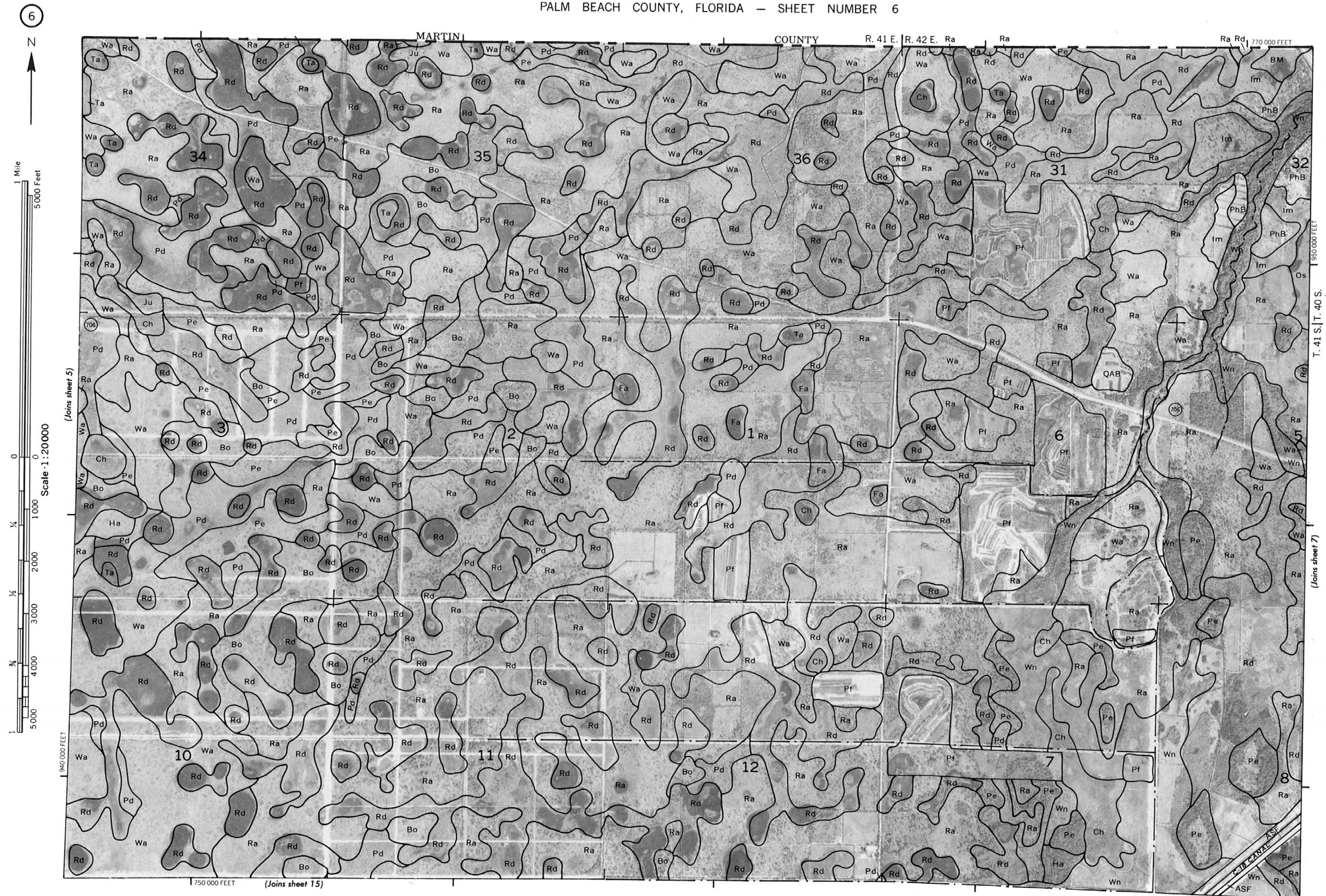
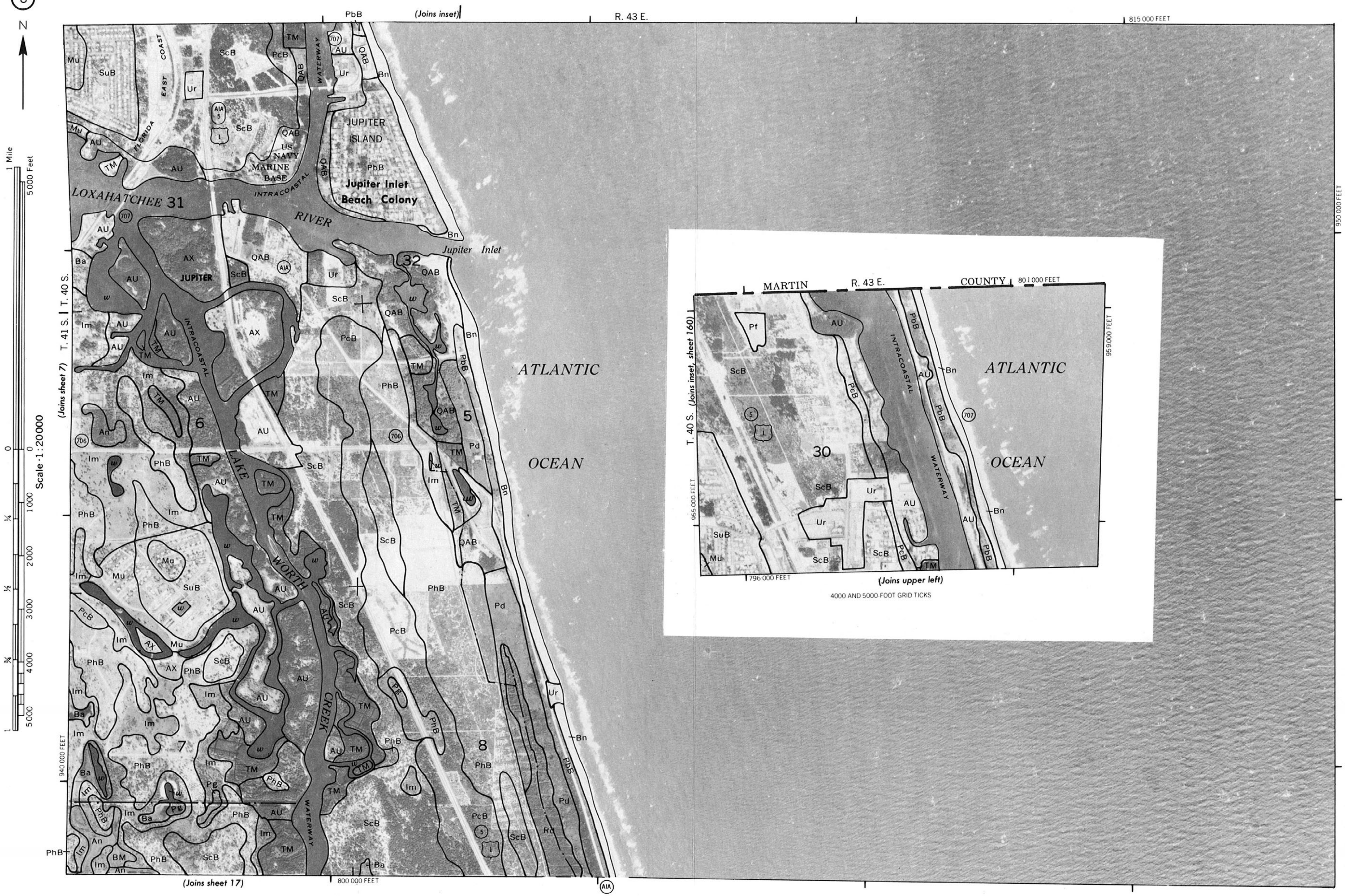
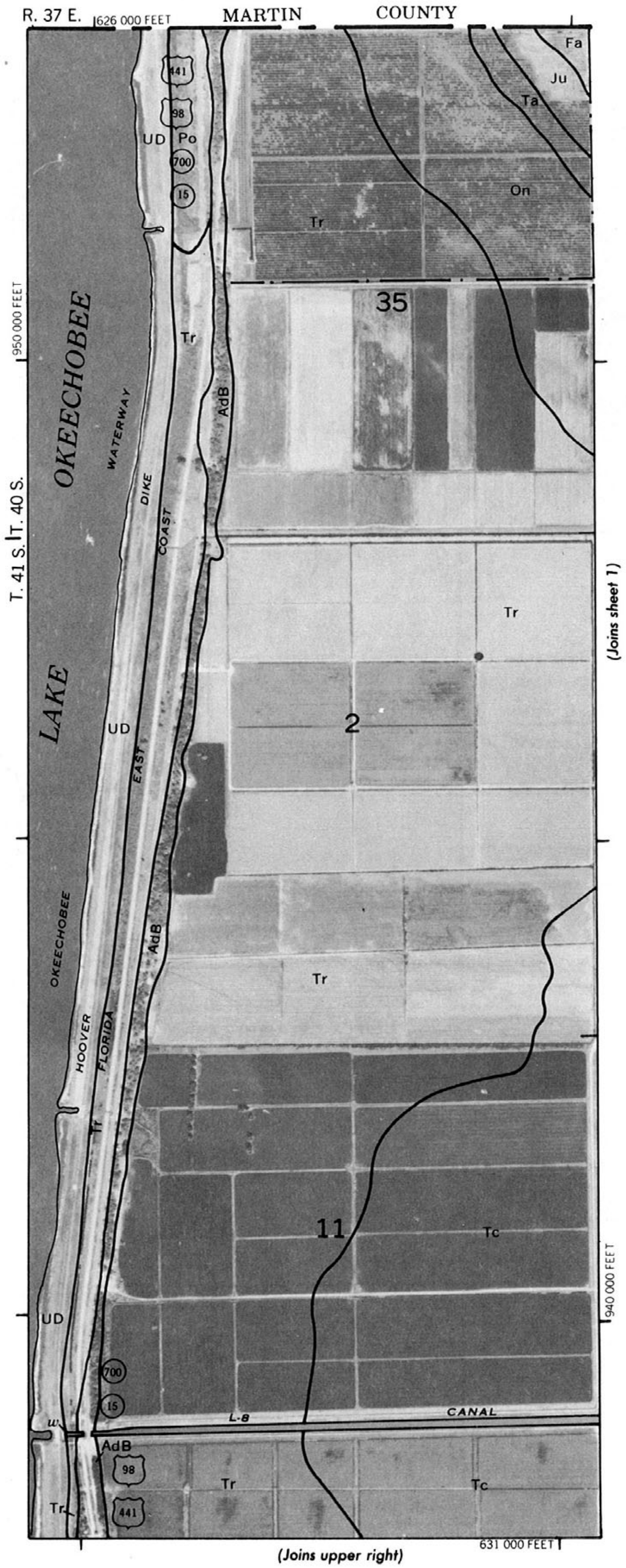
7
8
9
706
710
AU
S.C.L.

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 6




MARTIN COUNTY
775 000 FEET
(Joins inset, sheet 160)
R. 42 E.
NORTH FORK
Tequesta
LOXAHATCHEE
RIVER
SOUTHWEST FORK
JUPITER
CANAL
SUNSHINE STATE PARKW
T. 40 S.
T. 41 S.
950 000 FEET
940 000 FEET
795 000 FEET
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 16)
EAST COAST FLORIDA
N
1 Mile
5000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
1000
2000
3000
4000
5000
water
32
33
34
35
36
5
4
3
2
1
8
9
10
11
12


8
N
Scale 1:20000
1 Mile
5000 Feet
PbB
(Joins inset)
R. 43 E.
815 000 FEET
950 000 FEET
LOXAHATCHEE
RIVER
JUPITER ISLAND
US NAVY MARINE BASE
INTRACOASTAL
WATERWAY
Jupiter Inlet Beach Colony
Jupiter Inlet
JUPITER
ATLANTIC
OCEAN
LAKE
WORTH
CREEK
FLORIDA
EAST
COAST
T. 40 S.
T. 41 S.
(Joins sheet 7)
940 000 FEET
(Joins sheet 17)
800 000 FEET
MARTIN
COUNTY
801 000 FEET
959 000 FEET
955 000 FEET
(Joins inset, sheet 160)
796 000 FEET
(Joins upper left)
4000 AND 5000-FOOT GRID TICKS


R. 37 E.
626 000 FEET
MARTIN COUNTY
T. 41 S. | T. 40 S.
950 000 FEET
LAKE OKEECHOBEE
OKEECHOBEE WATERWAY
HOOVER DIKE
EAST COAST
FLORIDA
L-8 CANAL
35
2
11
Fa
Ju
Ta
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Tr
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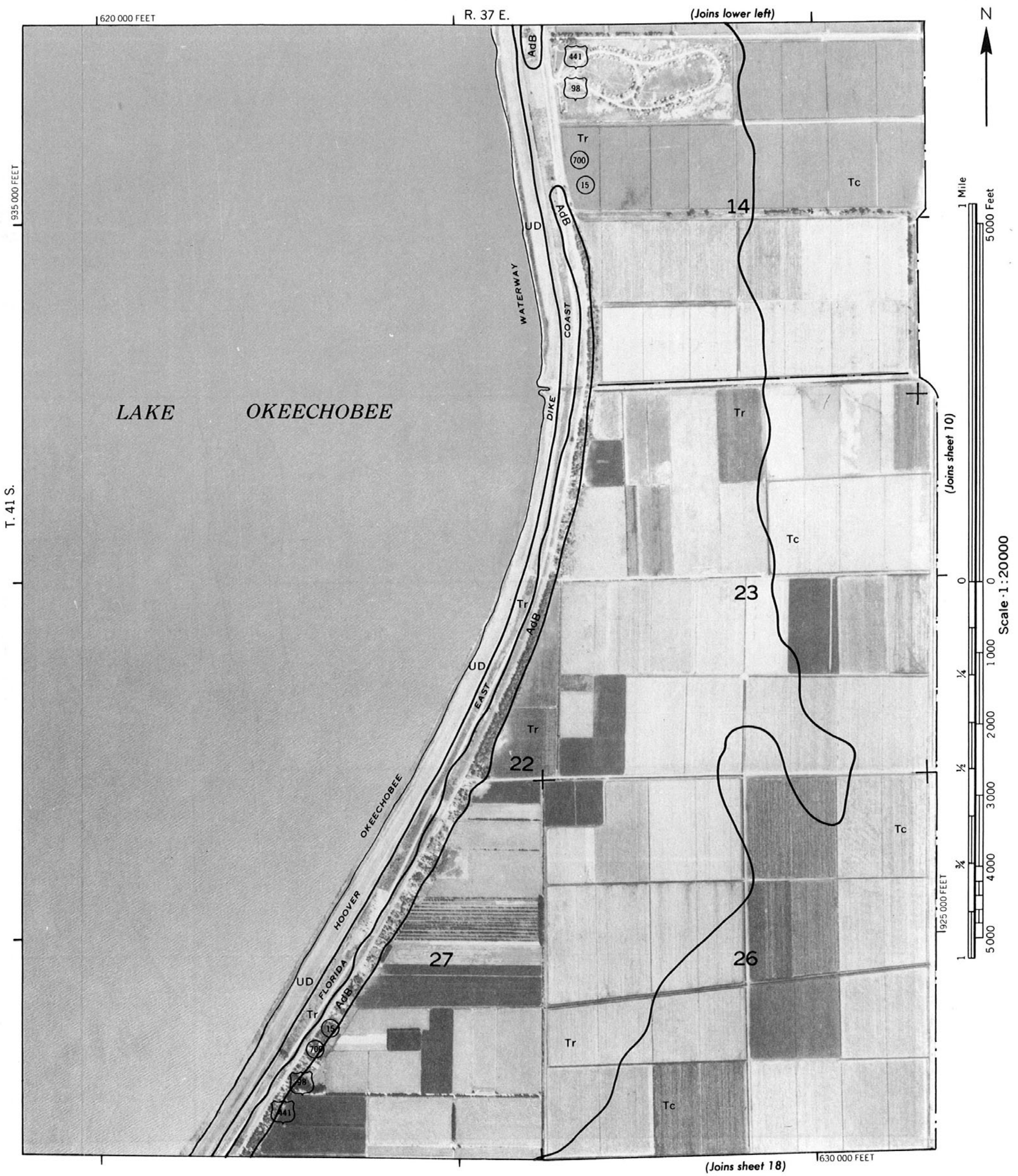
UD
Po
AdB
441
98
700
15
(Joins sheet 1)
940 000 FEET
631 000 FEET
(Joins upper right)


620 000 FEET
R. 37 E.
(Joins lower left)
935 000 FEET
T. 41 S.
LAKE OKEECHOBEE
OKEECHOBEE WATERWAY
HOOVER DIKE
EAST COAST
FLORIDA
14
23
22
27
26
Tr
Tc
UD
AdB
441
98
700
15
(Joins sheet 10)
925 000 FEET
630 000 FEET
(Joins sheet 18)
N
1 Mile
5000 Feet
Scale 1:20000
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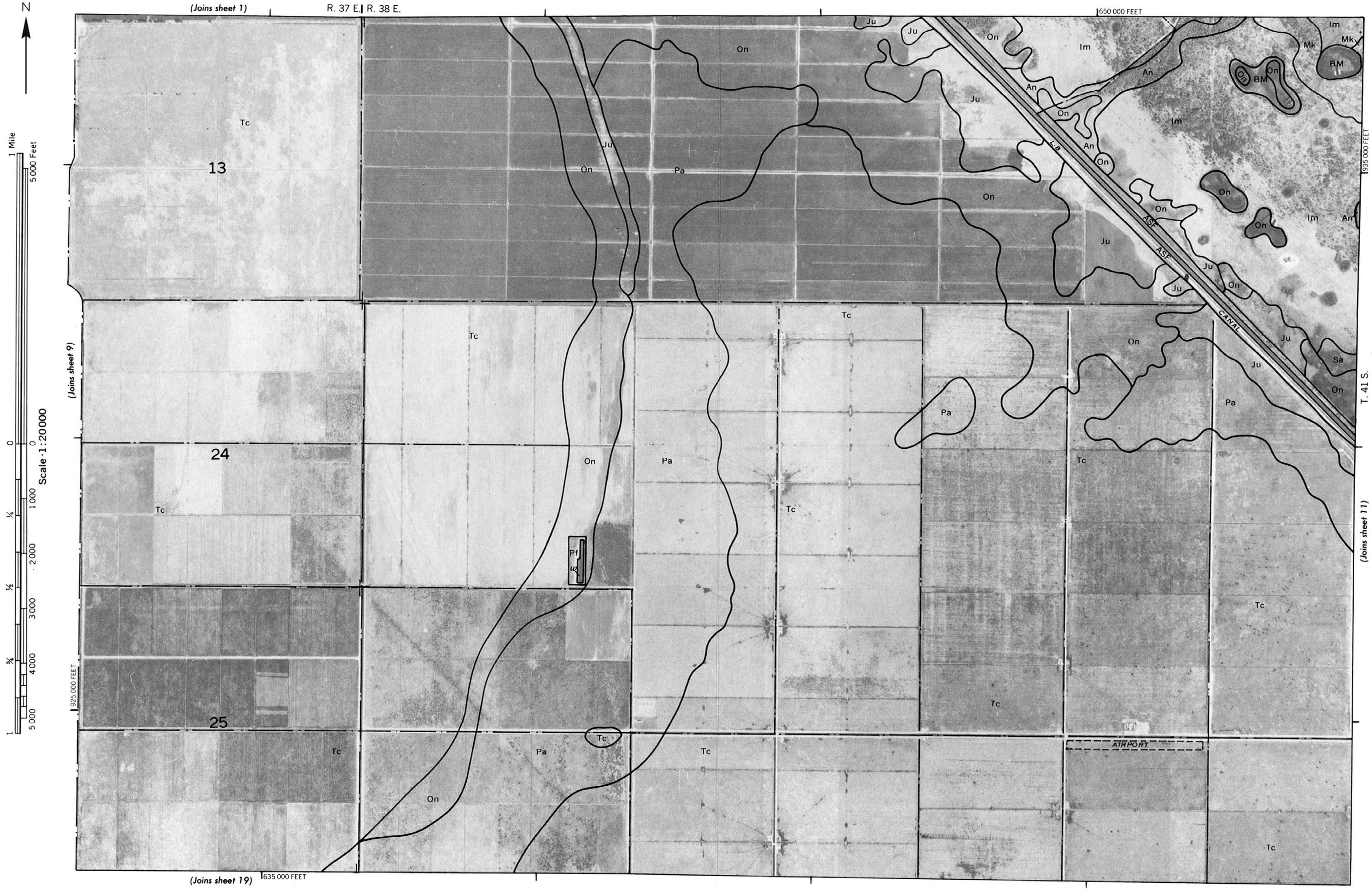
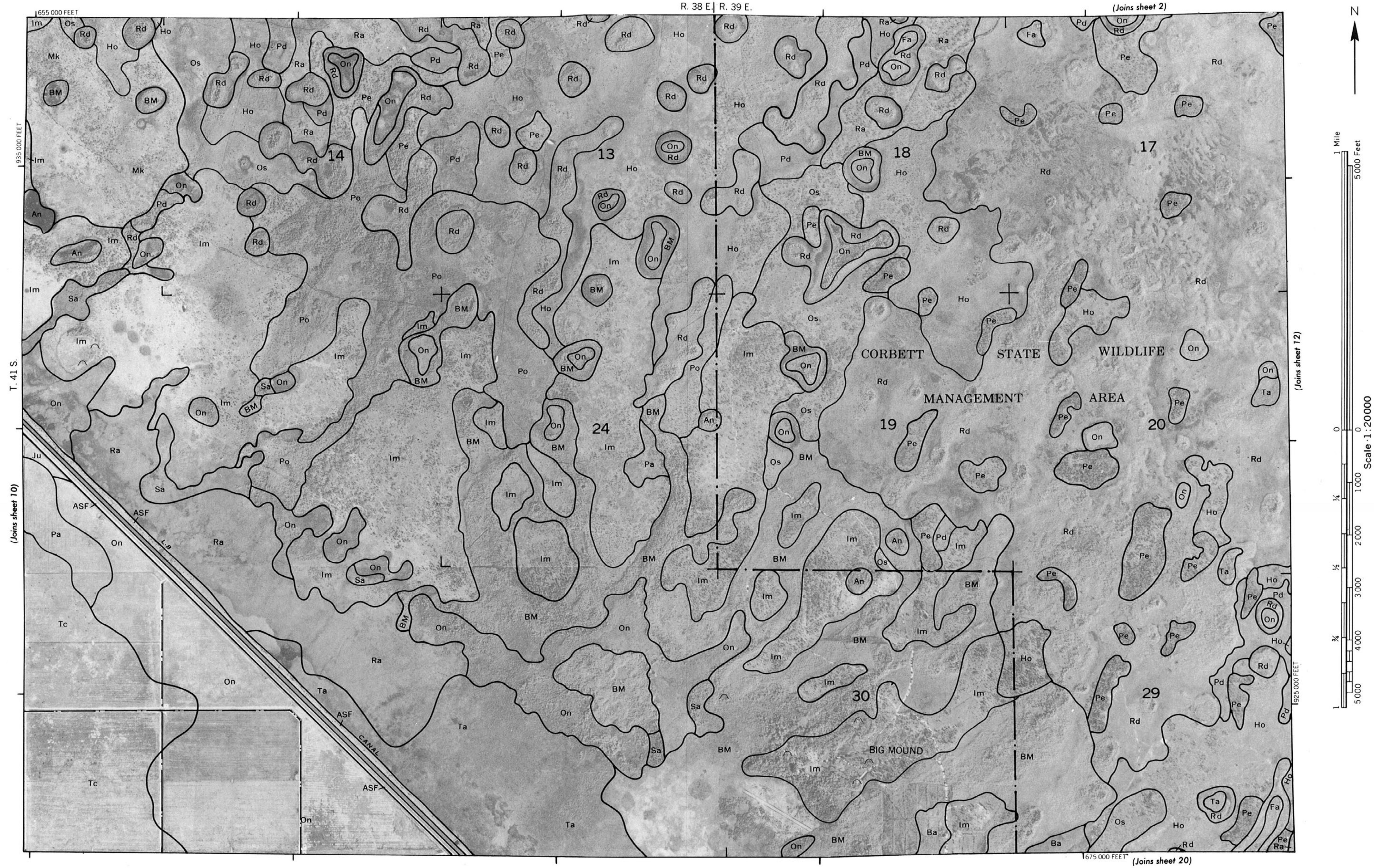
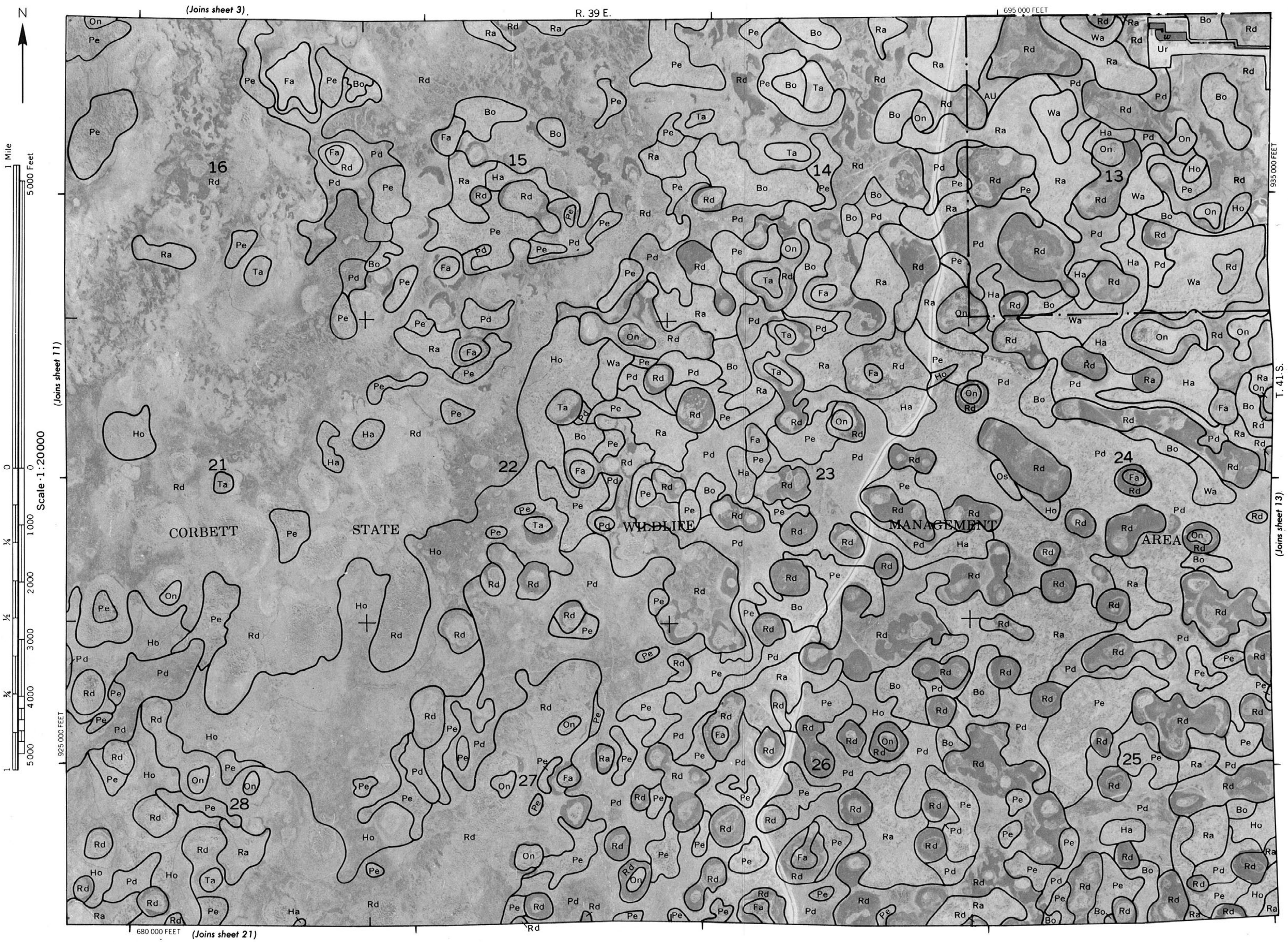
½
¾
1
1000
2000
3000
4000
5000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 10




655 000 FEET
R. 38 E. | R. 39 E.
(Joins sheet 2)
N
935 000 FEET
T. 41 S.
(Joins sheet 10)
(Joins sheet 12)
925 000 FEET
675 000 FEET
(Joins sheet 20)
CORBETT STATE WILDLIFE MANAGEMENT AREA
BIG MOUND
L-8 CANAL
14
13
18
17
24
19
20
30
29
1 Mile
5 000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
1000
2000
3000
4000
5000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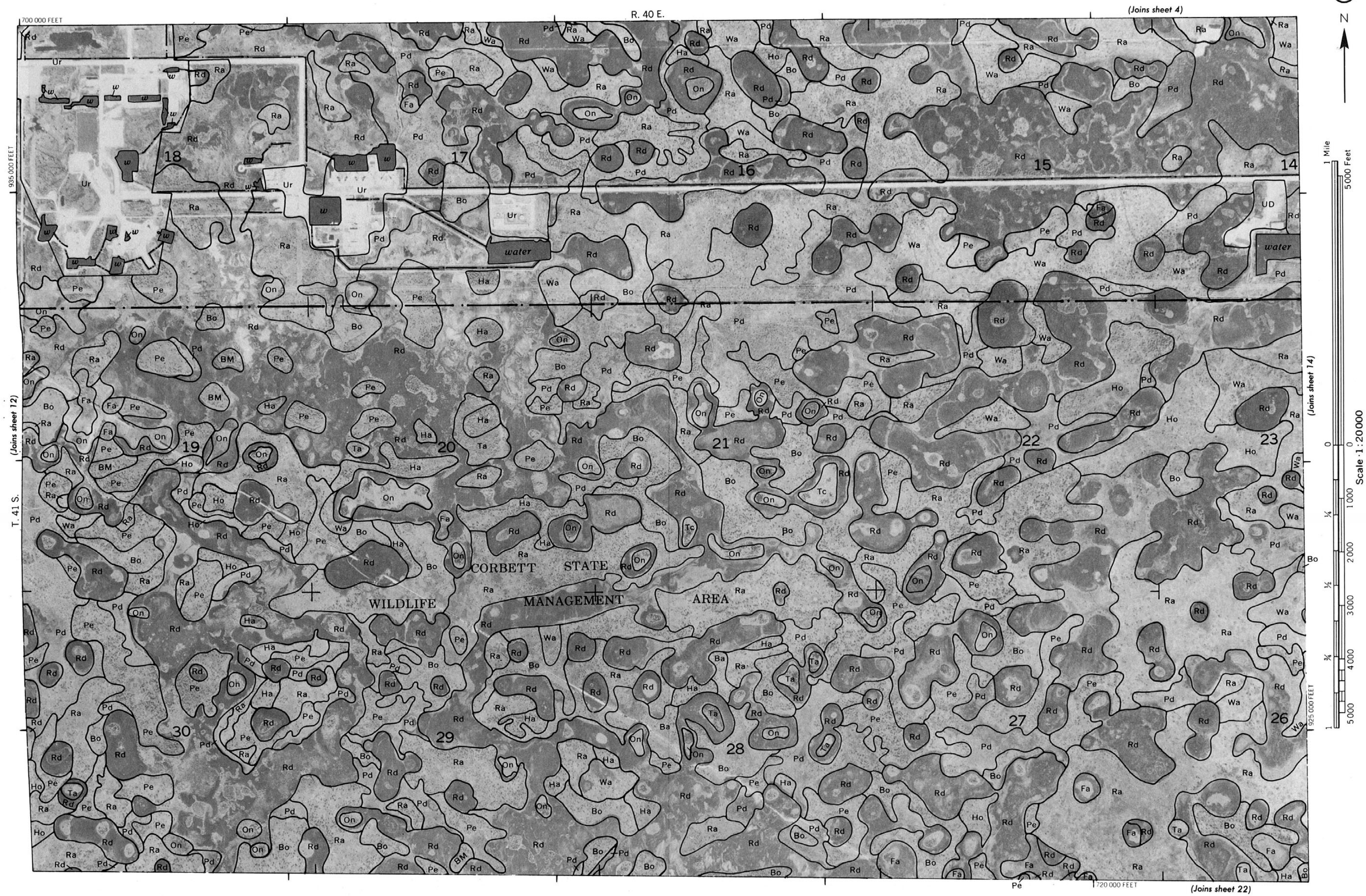
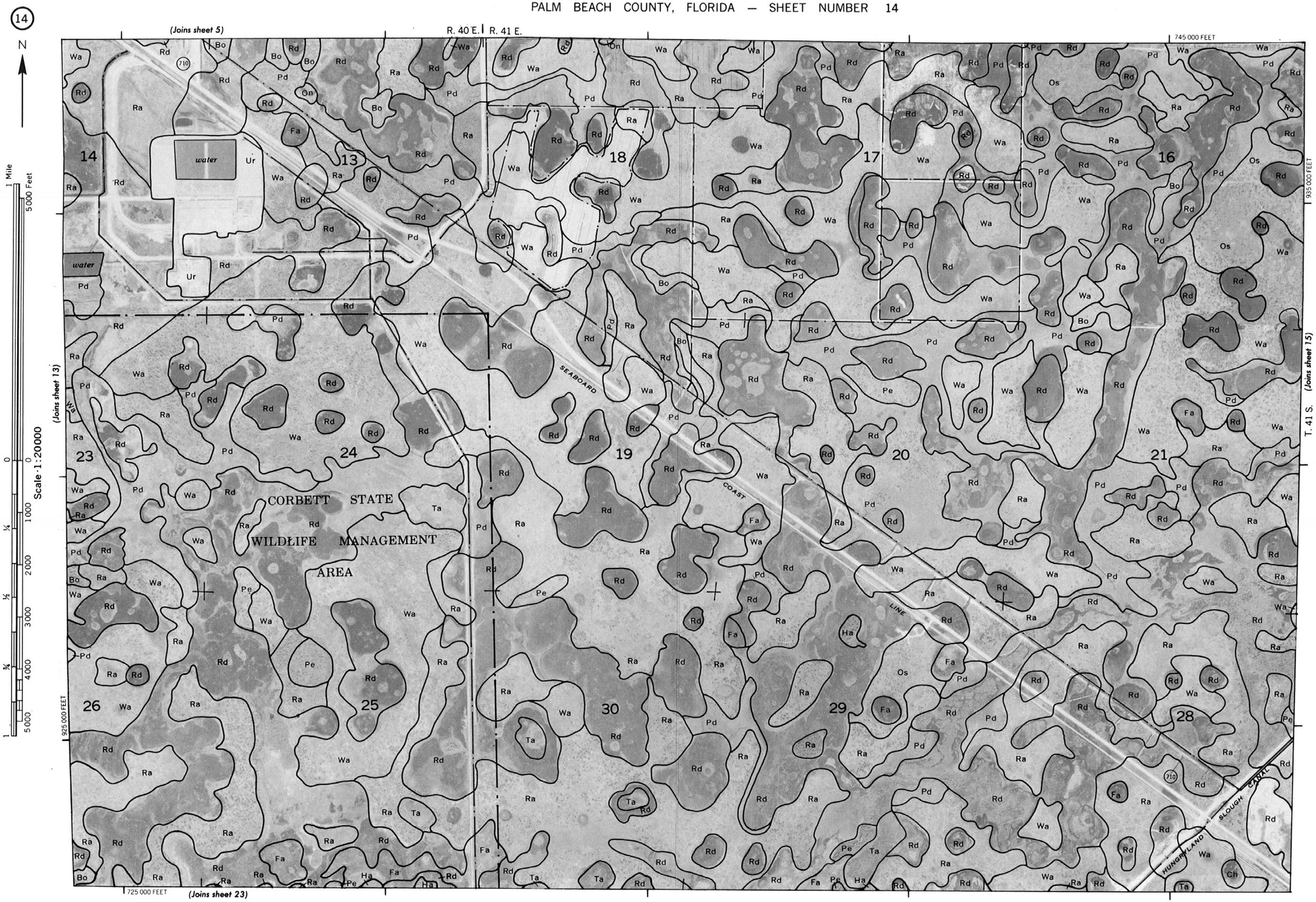
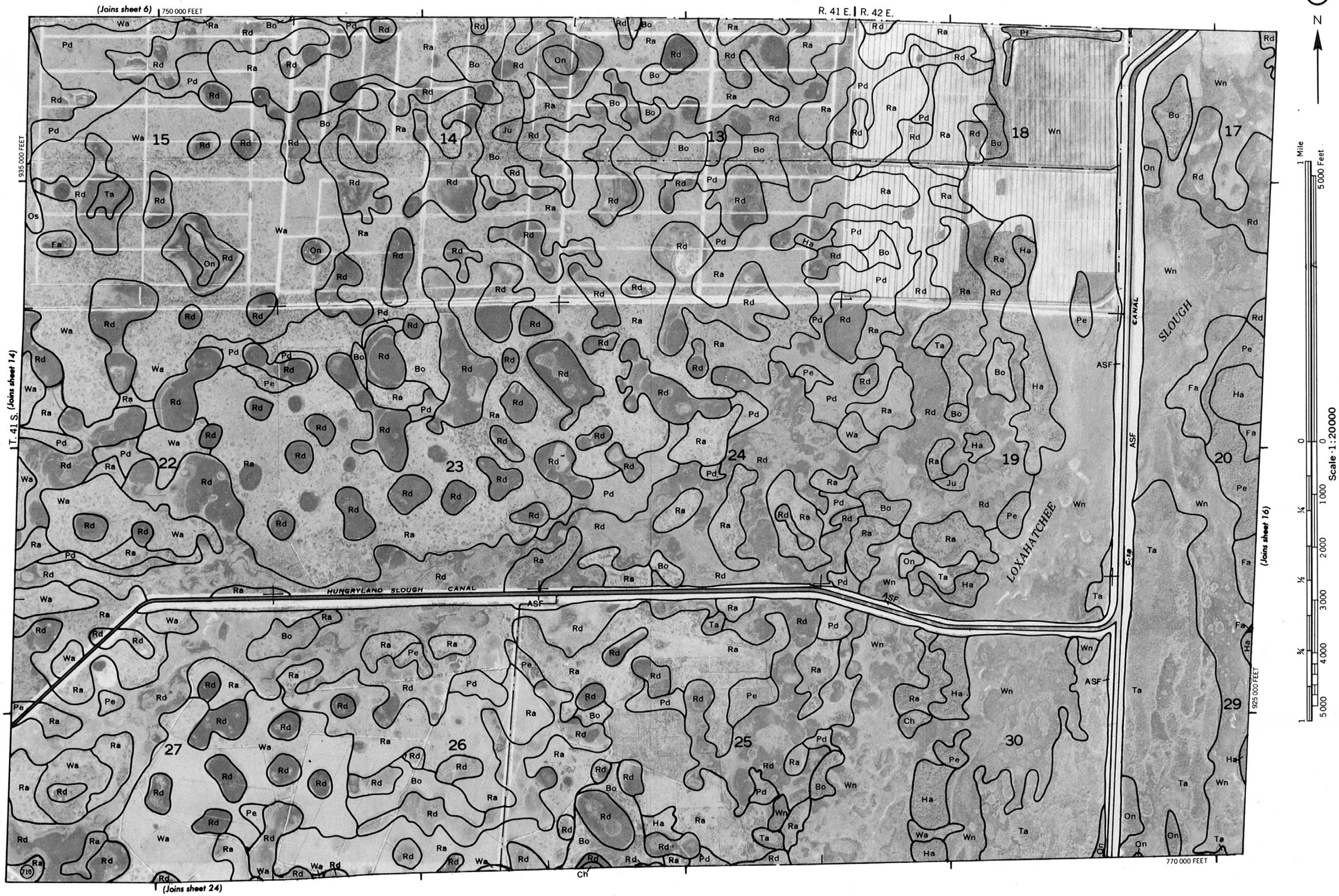
R. 39 E.
695 000 FEET
935 000 FEET
T. 41 S.
(Joins sheet 13)
(Joins sheet 11)
(Joins sheet 21)
680 000 FEET
925 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
CORBETT STATE WILDLIFE MANAGEMENT AREA

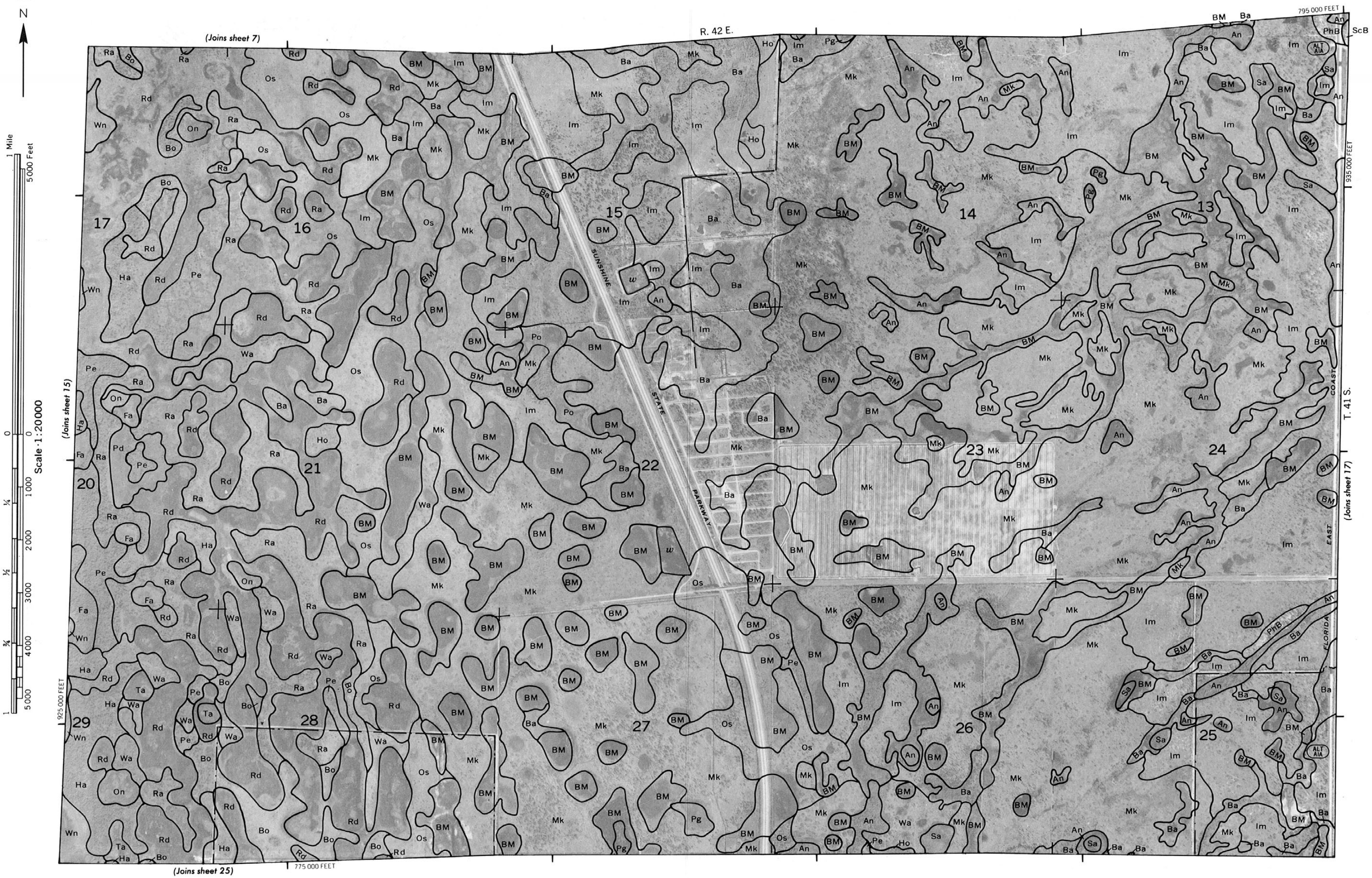

(Joins sheet 4)
R. 40 E.
700 000 FEET
935 000 FEET
T. 41 S.
(Joins sheet 12)
(Joins sheet 14)
(Joins sheet 22)
720 000 FEET
925 000 FEET
CORBETT STATE WILDLIFE MANAGEMENT AREA
water
N
1 Mile
5000 Feet
Scale 1:20000


14
N
(Joins sheet 5)
R. 40 E.
R. 41 E.
745 000 FEET
935 000 FEET
(Joins sheet 15)
T. 41 S.
(Joins sheet 13)
(Joins sheet 23)
725 000 FEET
925 000 FEET
1 Mile
5 000 Feet
Scale 1:20000
CORBETT STATE WILDLIFE MANAGEMENT AREA
SEABOARD COAST LINE
HUNGRYLAND SLOUGH CANAL
water
710
Bo Ch Fa Ha On Os Pd Pe Ra Rd Ta Ur Wa
13 14 16 17 18 19 20 21 23 24 25 26 28 29 30

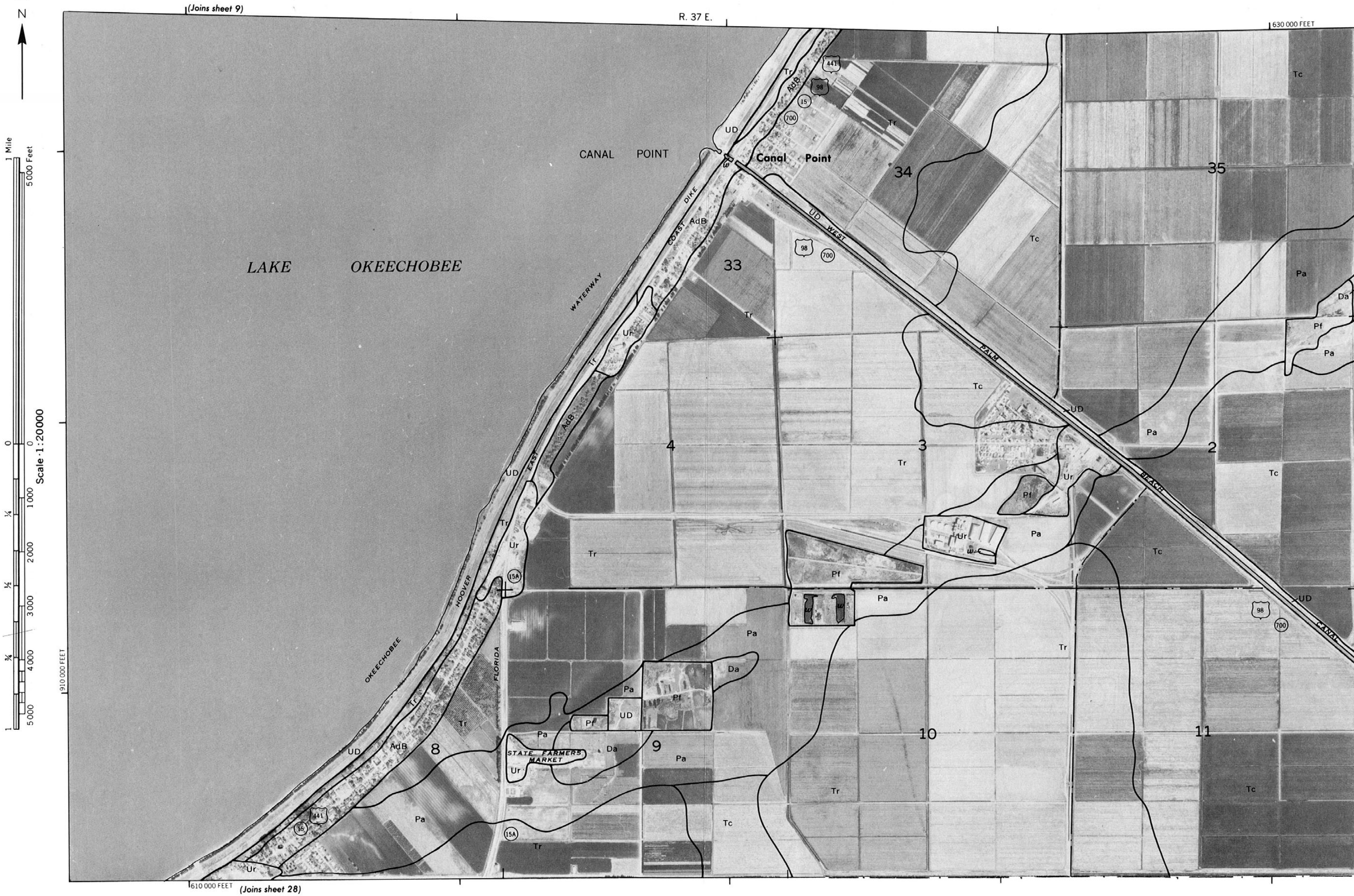

15
N
(Joins sheet 6)
750 000 FEET
R. 41 E. | R. 42 E.
935 000 FEET
T. 41 S.
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 24)
925 000 FEET
770 000 FEET
HUNGRYLAND SLOUGH CANAL
LOXAHATCHEE
SLOUGH
C-18 CANAL
ASF
710
13
14
15
17
18
19
20
22
23
24
25
26
27
29
30
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

16

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 16

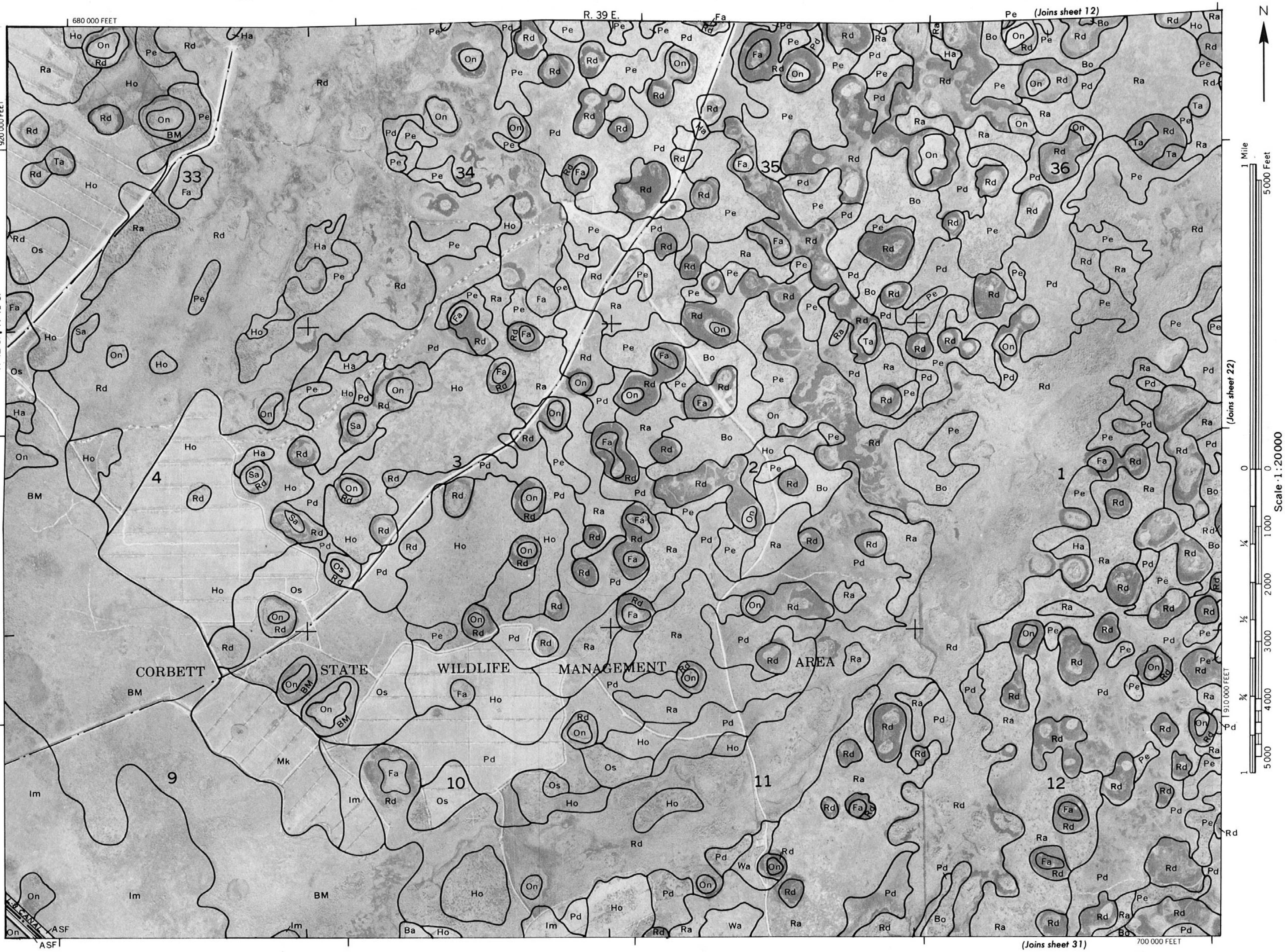



800 000 FEET
R. 43 E.
(Joins sheet 8)
935 000 FEET
T. 41 S.
(Joins sheet 16)
(Joins sheet 26)
815 000 FEET
925 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
ATLANTIC
OCEAN
INTRACOASTAL
LAKE
WORTH
CREEK
WATERWAY
Frenchmans
Creek
Juno
Beach
water
17
18
19
20
21
28
29
30


(Joins sheet 9)
R. 37 E.
630 000 FEET
920 000 FEET
T. 42 S. | T. 41 S.
(Joins sheet 19)
910 000 FEET
610 000 FEET
(Joins sheet 28)
N
1 Mile
5000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000
LAKE OKEECHOBEE
CANAL POINT
Canal Point
EAST COAST DIKE WATERWAY
HOOVER
OKEECHOBEE
FLORIDA
WEST PALM BEACH CANAL
STATE FARMERS MARKET
33
34
35
4
3
2
8
9
10
11
Tc
Tr
Pa
Pf
Da
Ur
UD
AdB
w
98
441
15
15A
700


N
635 000 FEET
R. 37 E.
R. 38 E.
(Joins sheet 10)
920 000 FEET
T. 41 S.
T. 42 S.
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 29)
910 000 FEET
655 000 FEET
1 Mile
5000 Feet
Scale 1:20000
36
1
6
5
4
3
12
7
8
9
10
Tc
Pa
Da
Ur
UD
w
WEST PALM BEACH CANAL
98
700

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 20


680 000 FEET
R. 39 E.
(Joins sheet 12)
N
920 000 FEET
T. 42 S. | T. 41 S.
(Joins sheet 20)
(Joins sheet 22)
CORBETT STATE WILDLIFE MANAGEMENT AREA
1 Mile
5000 Feet
Scale 1:20000
910 000 FEET
L-8 CANAL
(Joins sheet 31)
700 000 FEET

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 22

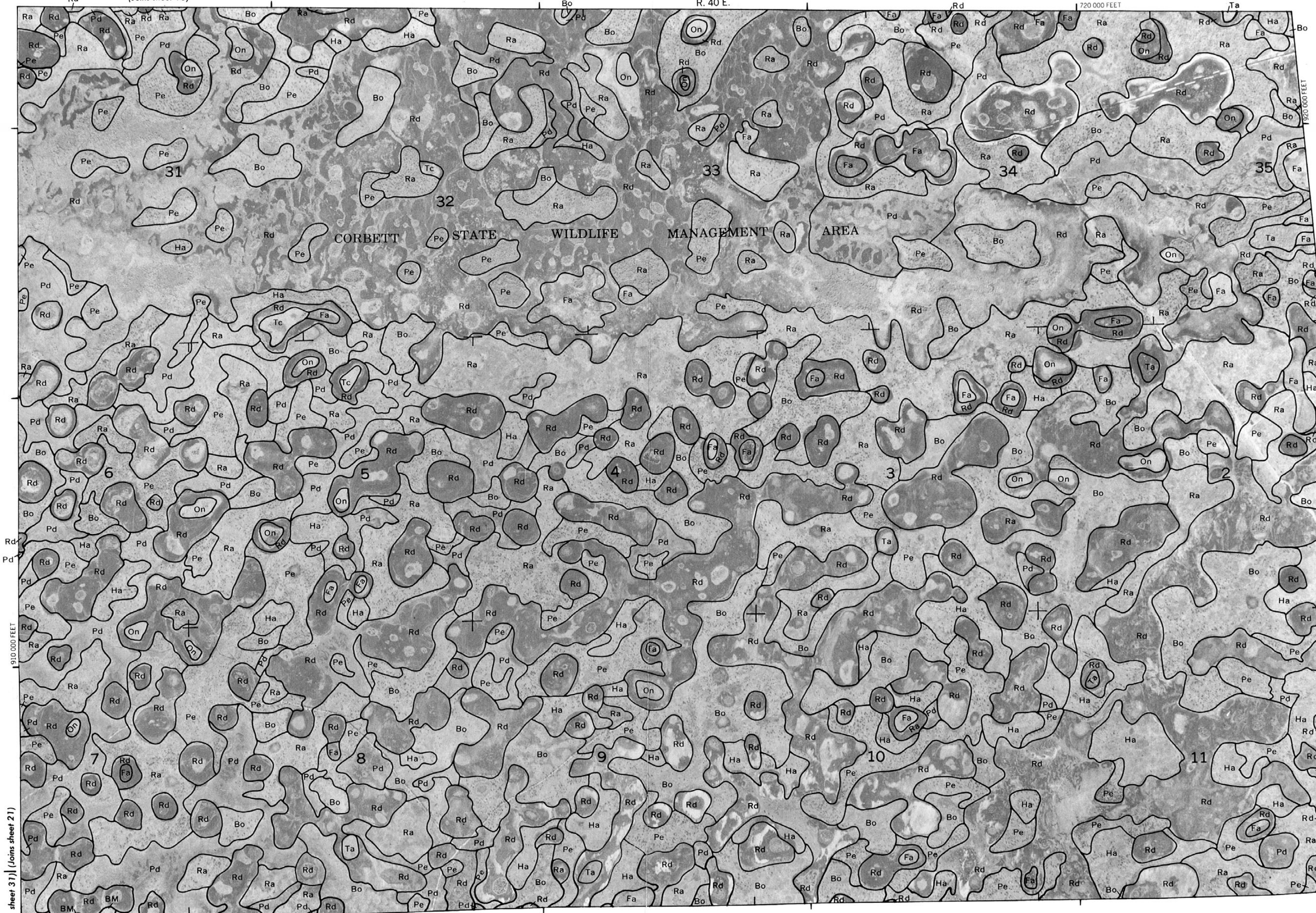
N

Scale 1:20 000

1 Mile

5000 Feet

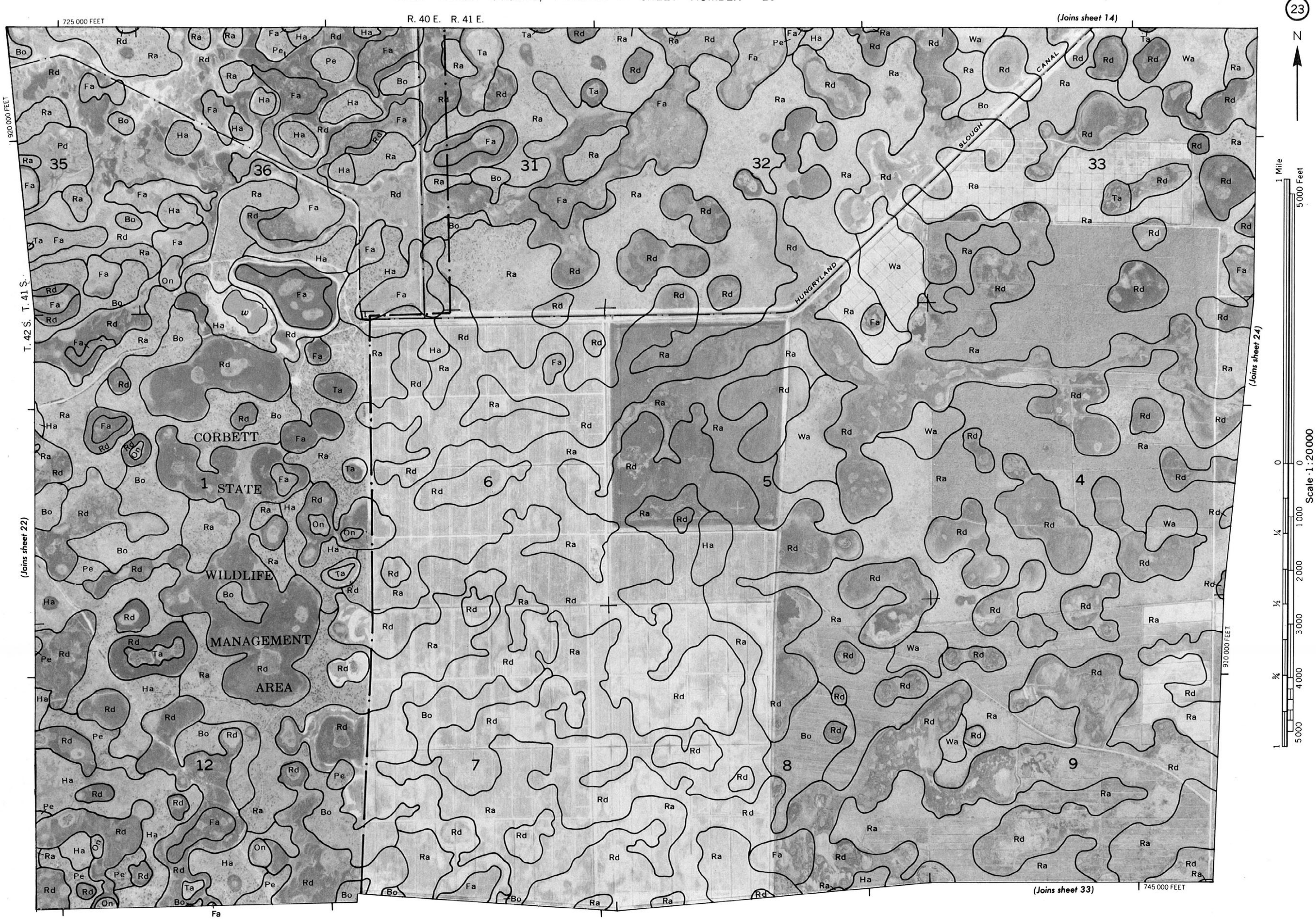
(Joins sheet 13)

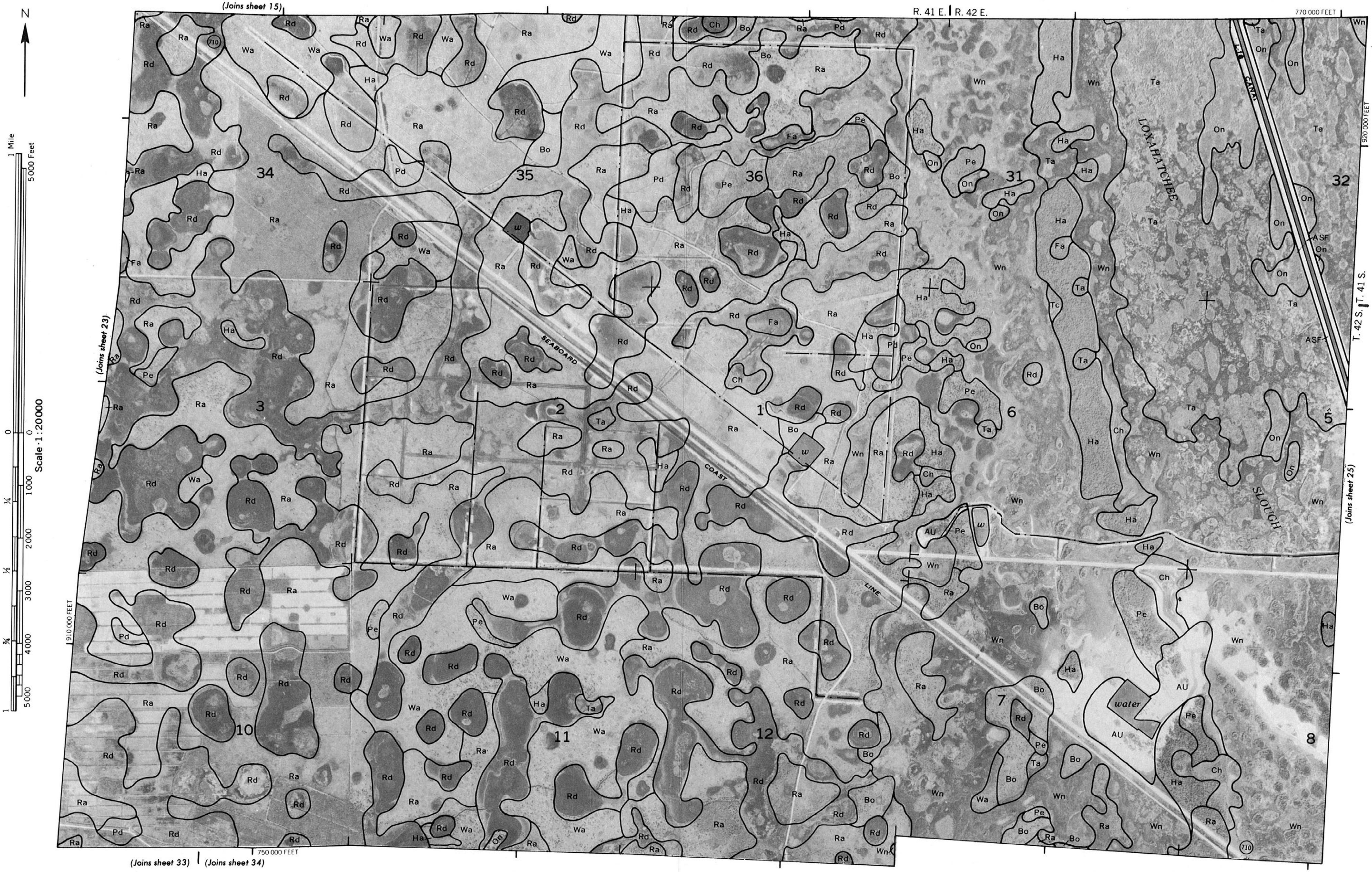


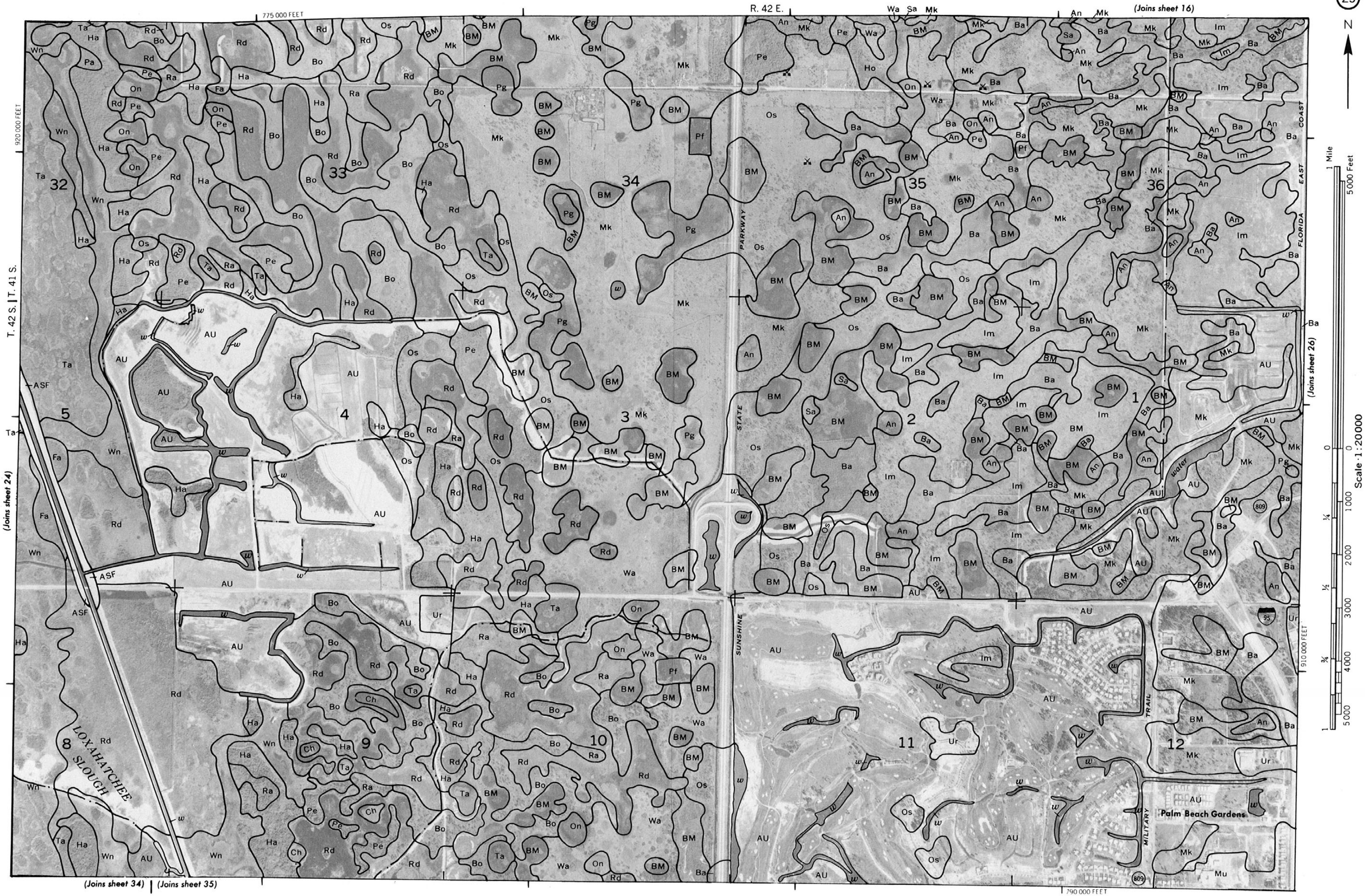
(Joins sheet 23)

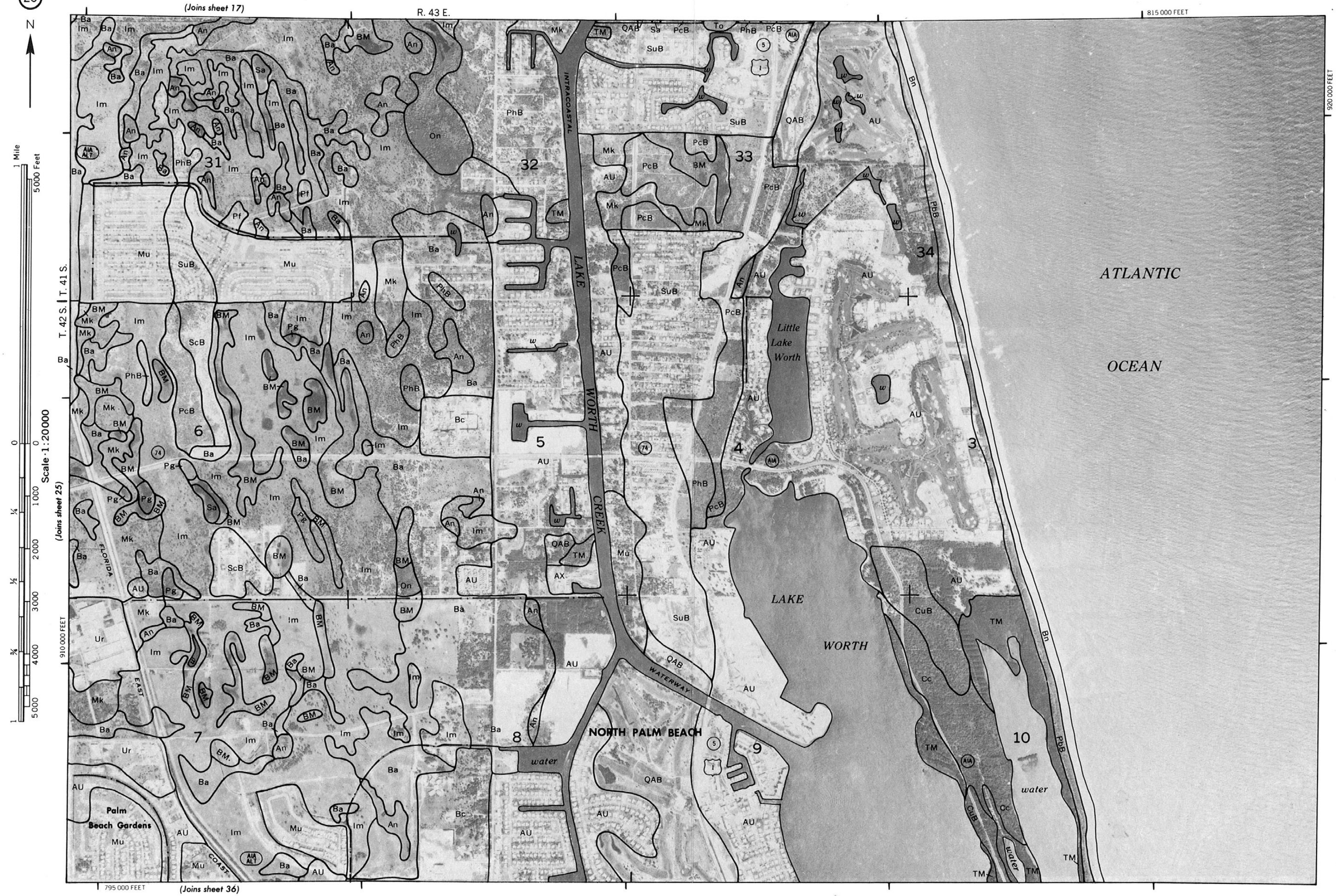
(Joins sheet 32)

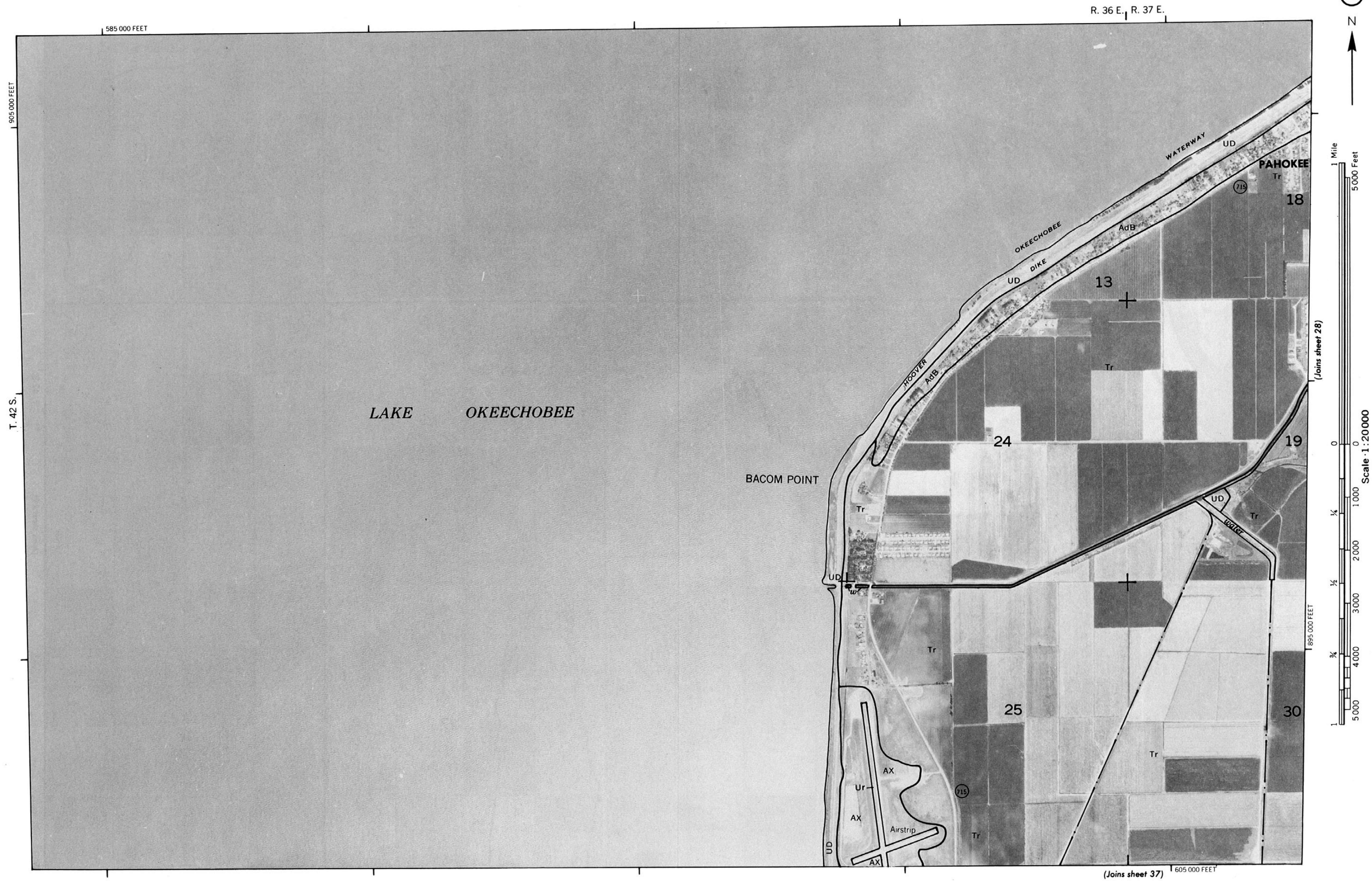
sheet 31) | (Joins sheet 21)


23
N
(Joins sheet 14)
(Joins sheet 24)
(Joins sheet 22)
(Joins sheet 33)
725 000 FEET
920 000 FEET
910 000 FEET
745 000 FEET
R. 40 E. R. 41 E.
T. 41 S.
T. 42 S.
CORBETT STATE WILDLIFE MANAGEMENT AREA
HUNGRYLAND SLOUGH CANAL
1 Mile
5000 Feet
Scale 1:20000

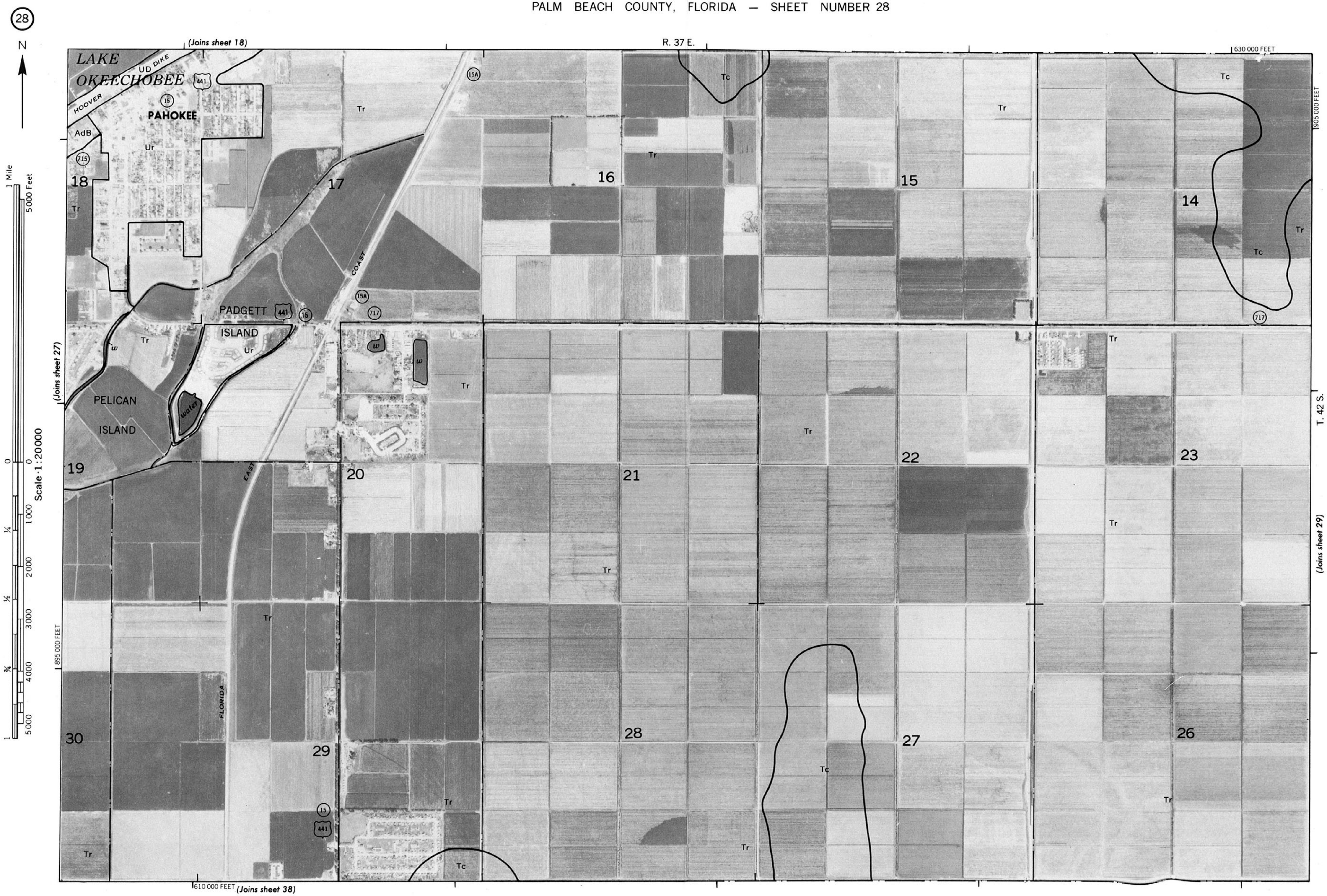

N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
(Joins sheet 15)
R. 41 E.
R. 42 E.
770 000 FEET
920 000 FEET
T. 41 S.
T. 42 S.
(Joins sheet 23)
(Joins sheet 25)
910 000 FEET
750 000 FEET
(Joins sheet 33)
(Joins sheet 34)
SEABOARD
COAST
LINE
LOXAHATCHEE
SLOUGH
CANAL
710
34
35
36
31
32
3
2
1
6
5
10
11
12
7
8
water

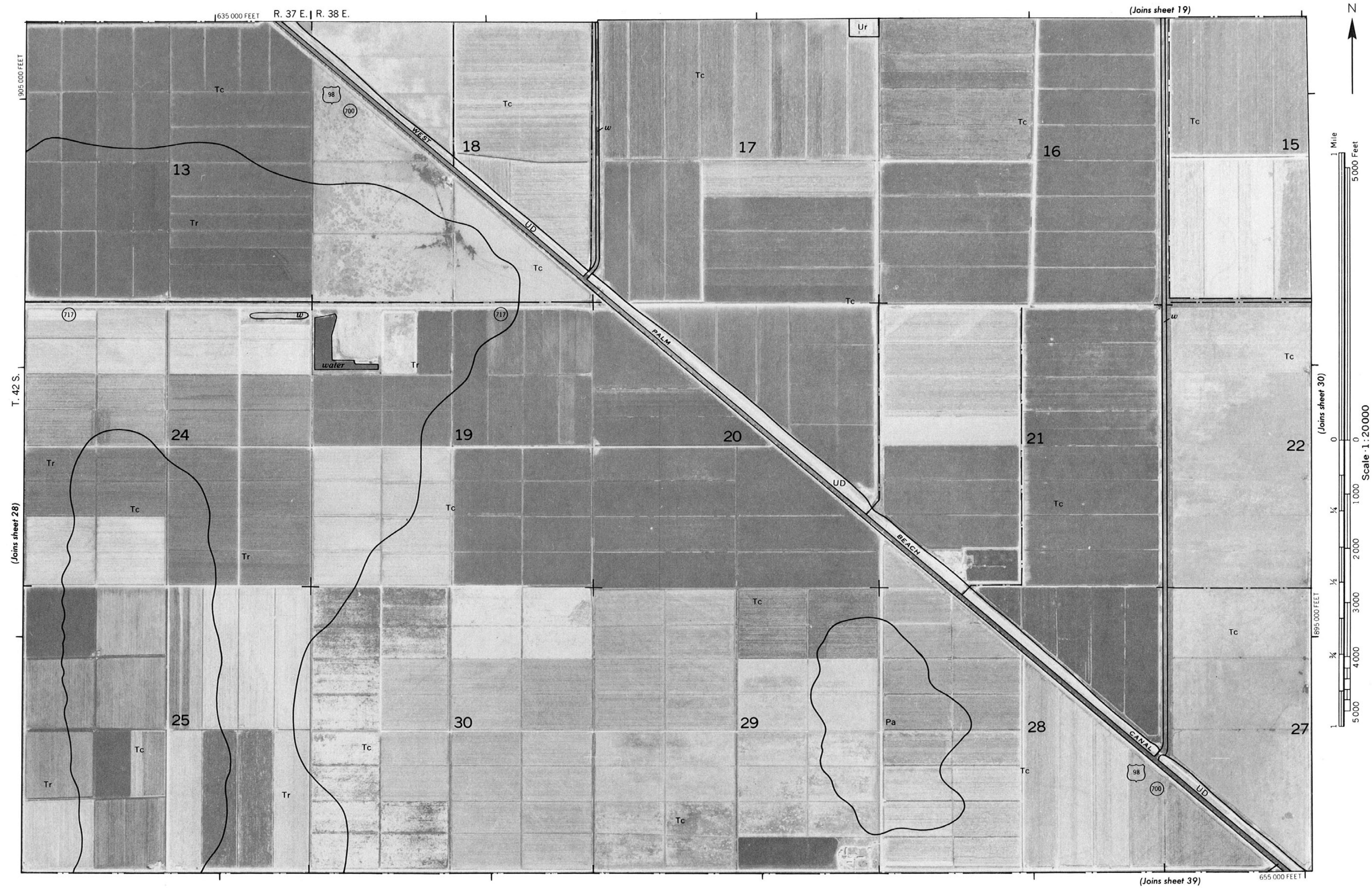

(Joins sheet 16)
(Joins sheet 24)
(Joins sheet 26)
(Joins sheet 34)
(Joins sheet 35)
775 000 FEET
790 000 FEET
920 000 FEET
910 000 FEET
R. 42 E.
T. 41 S.
T. 42 S.
N
STATE PARKWAY
SUNSHINE
FLORIDA EAST COAST
MILITARY TRAIL
LOXAHATCHEE SLOUGH
Palm Beach Gardens
Scale 1:20000
1 Mile
5000 Feet

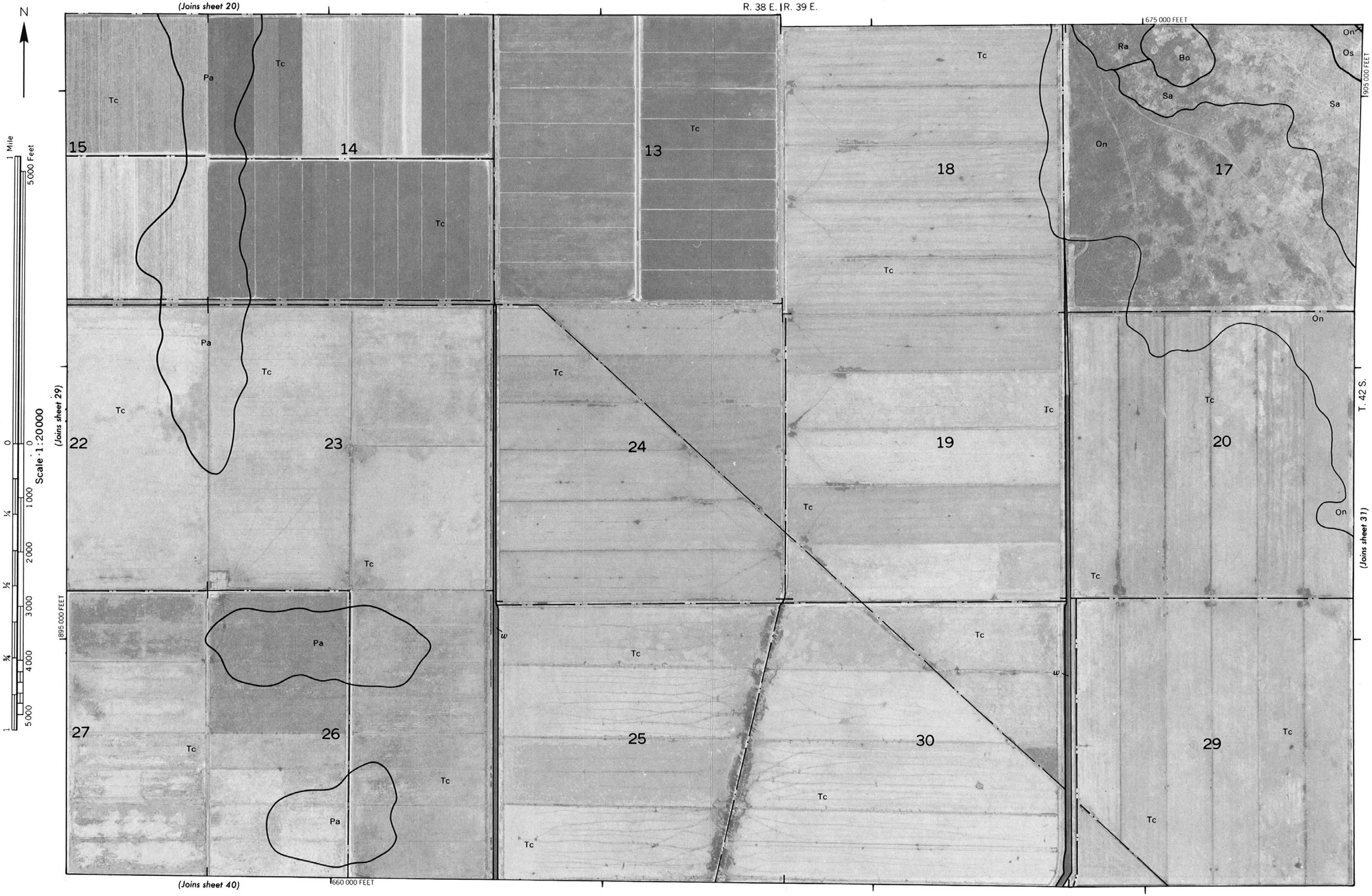

26
N
(Joins sheet 17)
R. 43 E.
815 000 FEET
920 000 FEET
T. 42 S. | T. 41 S.
Scale 1:20000
(Joins sheet 25)
910 000 FEET
795 000 FEET
(Joins sheet 36)
ATLANTIC
OCEAN
Little
Lake
Worth
LAKE
WORTH
INTRACOASTAL
LAKE
WORTH
CREEK
WATERWAY
NORTH PALM BEACH
Palm
Beach Gardens
FLORIDA
EAST
COAST
water

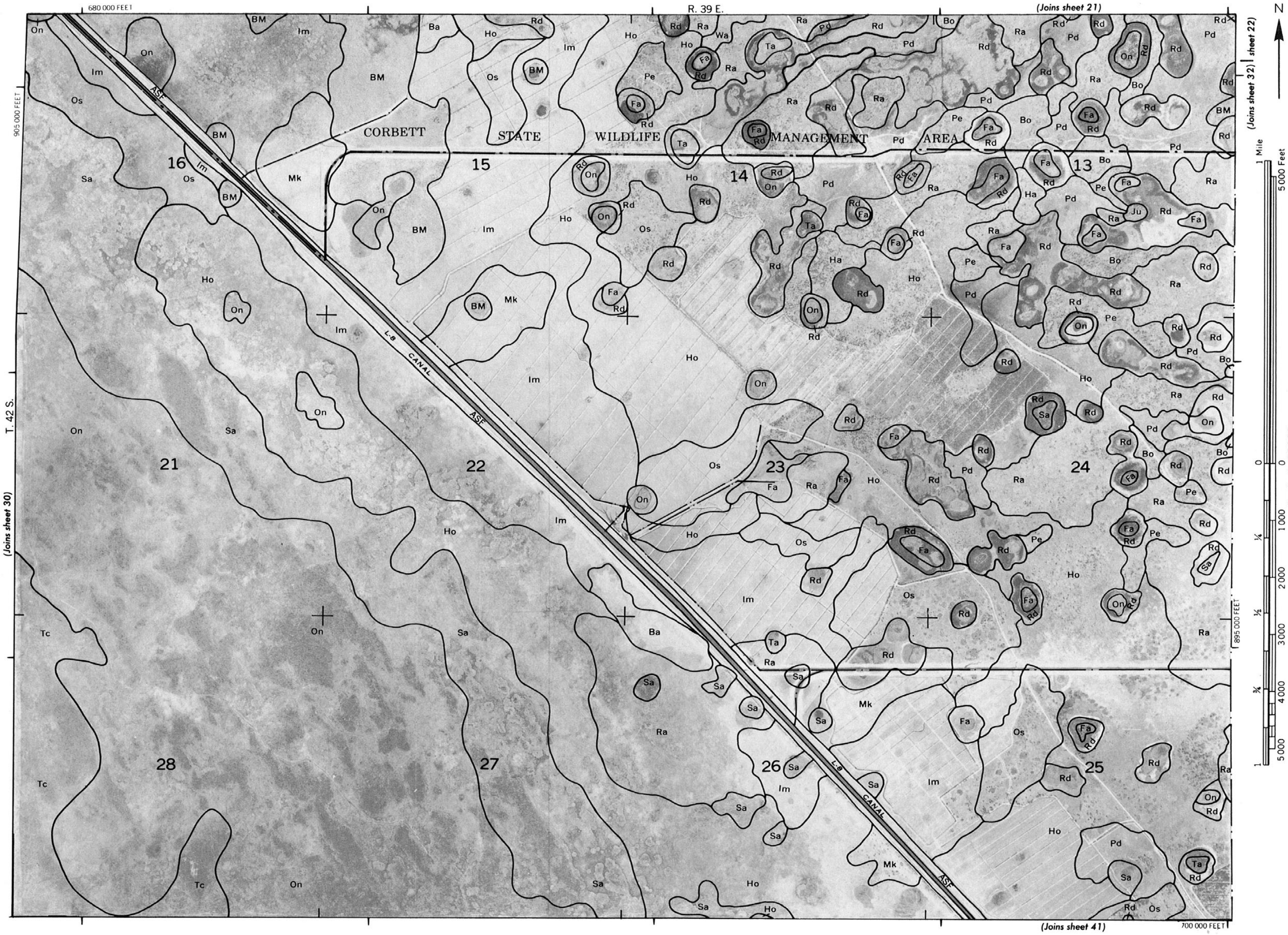


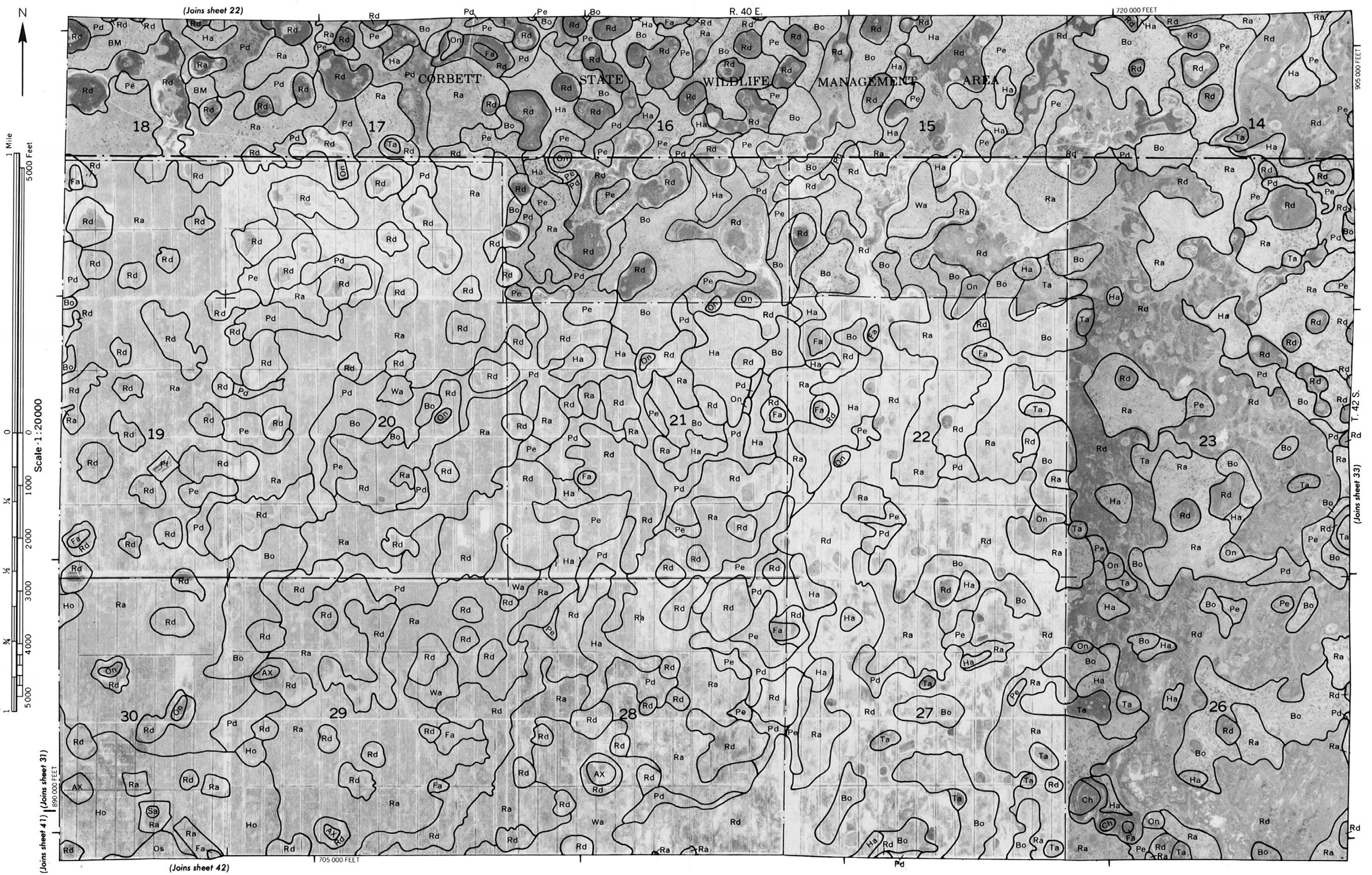
R. 36 E. R. 37 E.
585 000 FEET
905 000 FEET
T. 42 S.
LAKE OKEECHOBEE
BACOM POINT
HOOVER DIKE
OKEECHOBEE WATERWAY
PAHOKEE
UD
AdB
Tr
715
18
13
24
19
25
30
water
Ur
AX
Airstrip
(Joins sheet 28)
(Joins sheet 37)
895 000 FEET
605 000 FEET
N
Scale 1:20000
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1000
2000
3000
4000
5000

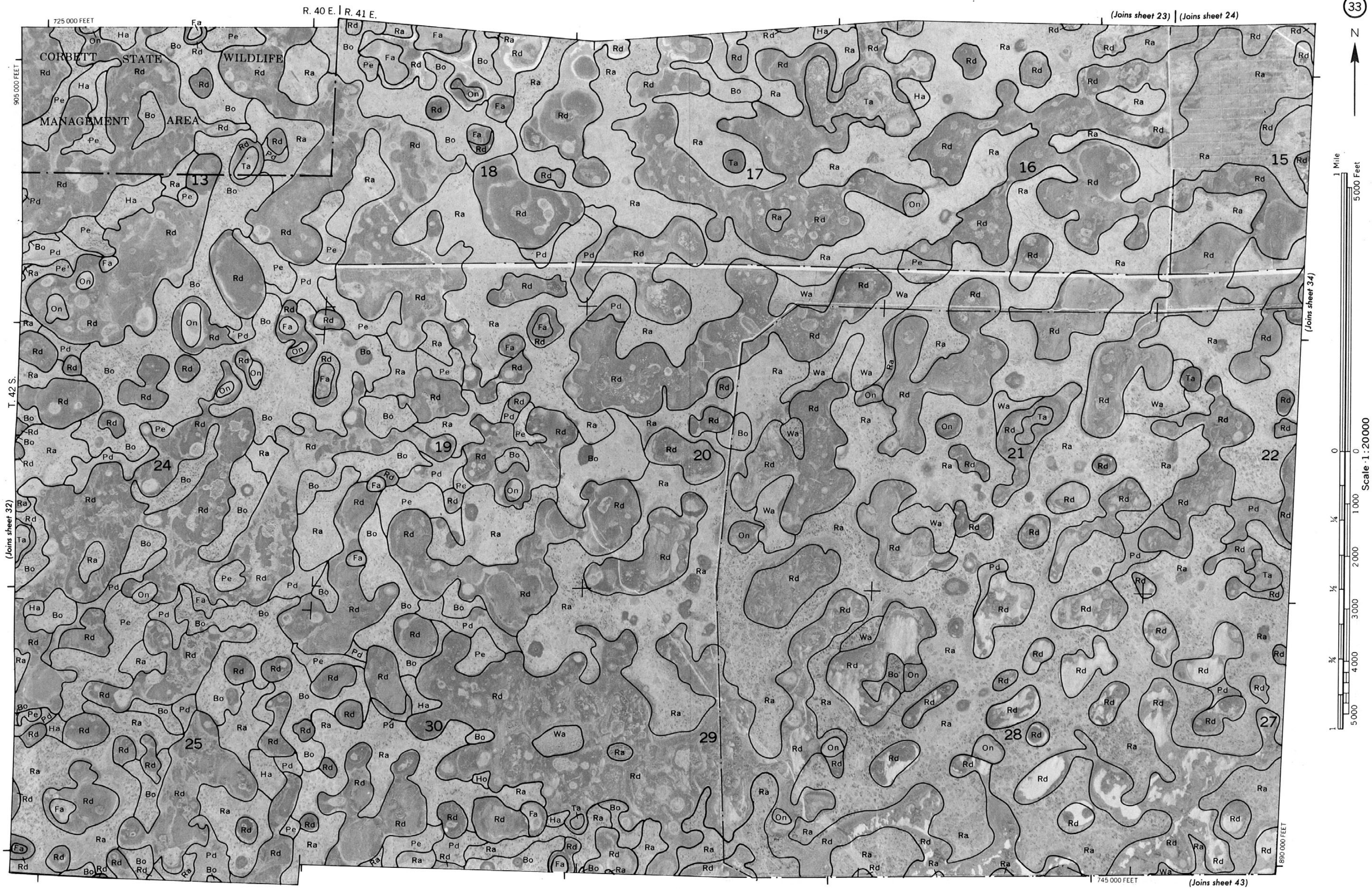

28
N
(Joins sheet 18)
R. 37 E.
630 000 FEET
905 000 FEET
LAKE OKEECHOBEE
HOOVER
UD DIKE
PAHOKEE
PADGETT ISLAND
PELICAN ISLAND
COAST
EAST
FLORIDA
AdB
Ur
Tr
Tc
W
water
441
15
15A
715
717
14
15
16
17
18
19
20
21
22
23
26
27
28
29
30
(Joins sheet 27)
(Joins sheet 29)
T. 42 S.
895 000 FEET
610 000 FEET (Joins sheet 38)
1 Mile
5000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000


(29)
N
635 000 FEET
R. 37 E. | R. 38 E.
(Joins sheet 19)
905 000 FEET
T. 42 S.
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 39)
895 000 FEET
655 000 FEET
1 Mile
5000 Feet
Scale 1:20000
13
15
16
17
18
19
20
21
22
24
25
27
28
29
30
Tc
Tr
Pa
Ur
w
water
WEST
PALM
BEACH
CANAL
UD
98
700
717

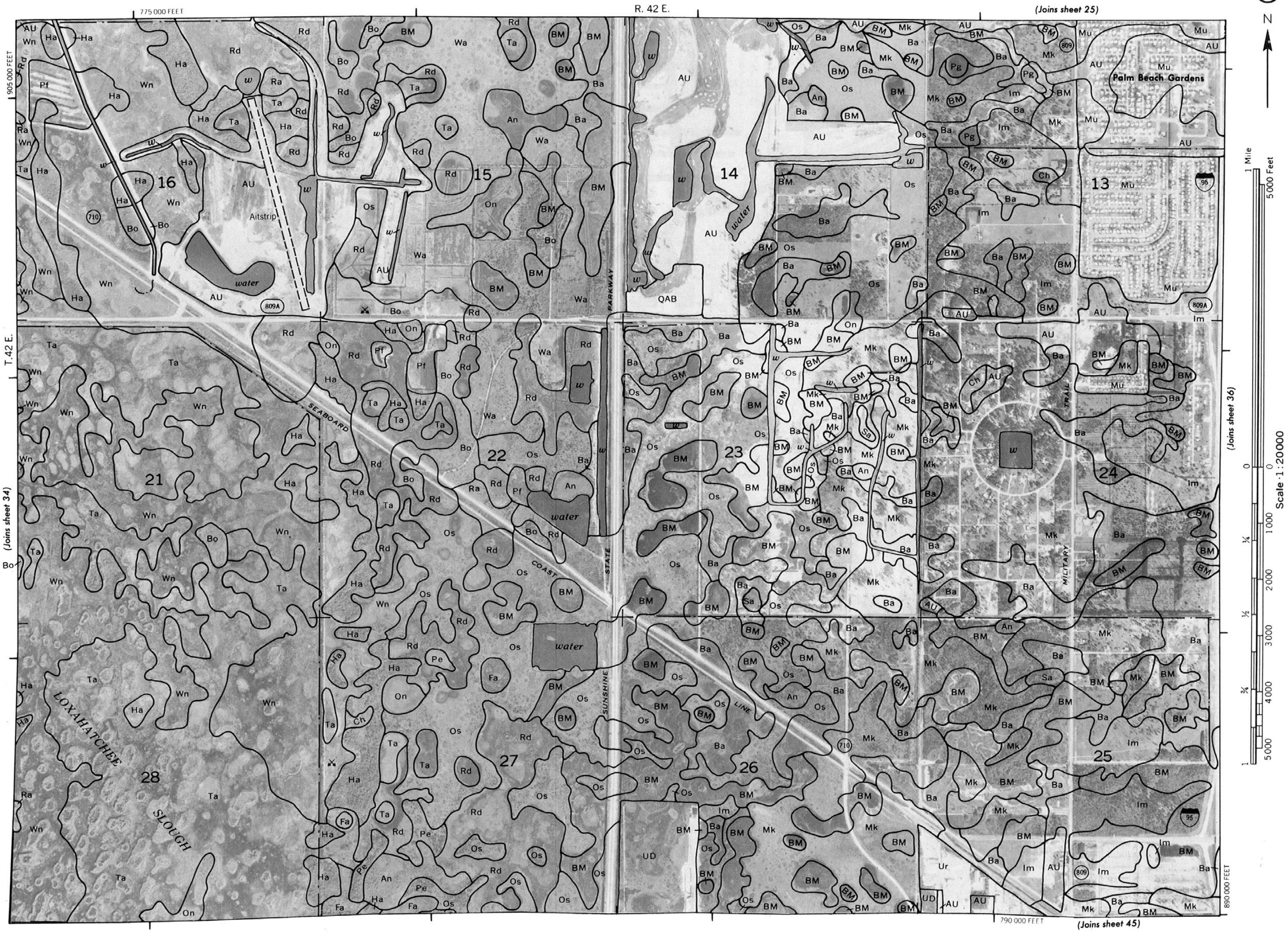

(Joins sheet 20)
R. 38 E. R. 39 E.
675 000 FEET
905 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
(Joins sheet 29)
(Joins sheet 31)
T. 42 S.
895 000 FEET
(Joins sheet 40)
660 000 FEET
Tc
Pa
Ra
Bo
Sa
On
Os
w
15
14
13
18
17
22
23
24
19
20
27
26
25
30
29


680 000 FEET
R. 39 E.
(Joins sheet 21)
(Joins sheet 22)
(Joins sheet 32)
N
905 000 FEET
CORBETT STATE WILDLIFE MANAGEMENT AREA
L-8 CANAL
ASF
T. 42 S.
(Joins sheet 30)
895 000 FEET
(Joins sheet 41)
700 000 FEET
1 Mile
5000 Feet
Scale 1:20000
16
15
14
13
21
22
23
24
28
27
26
25

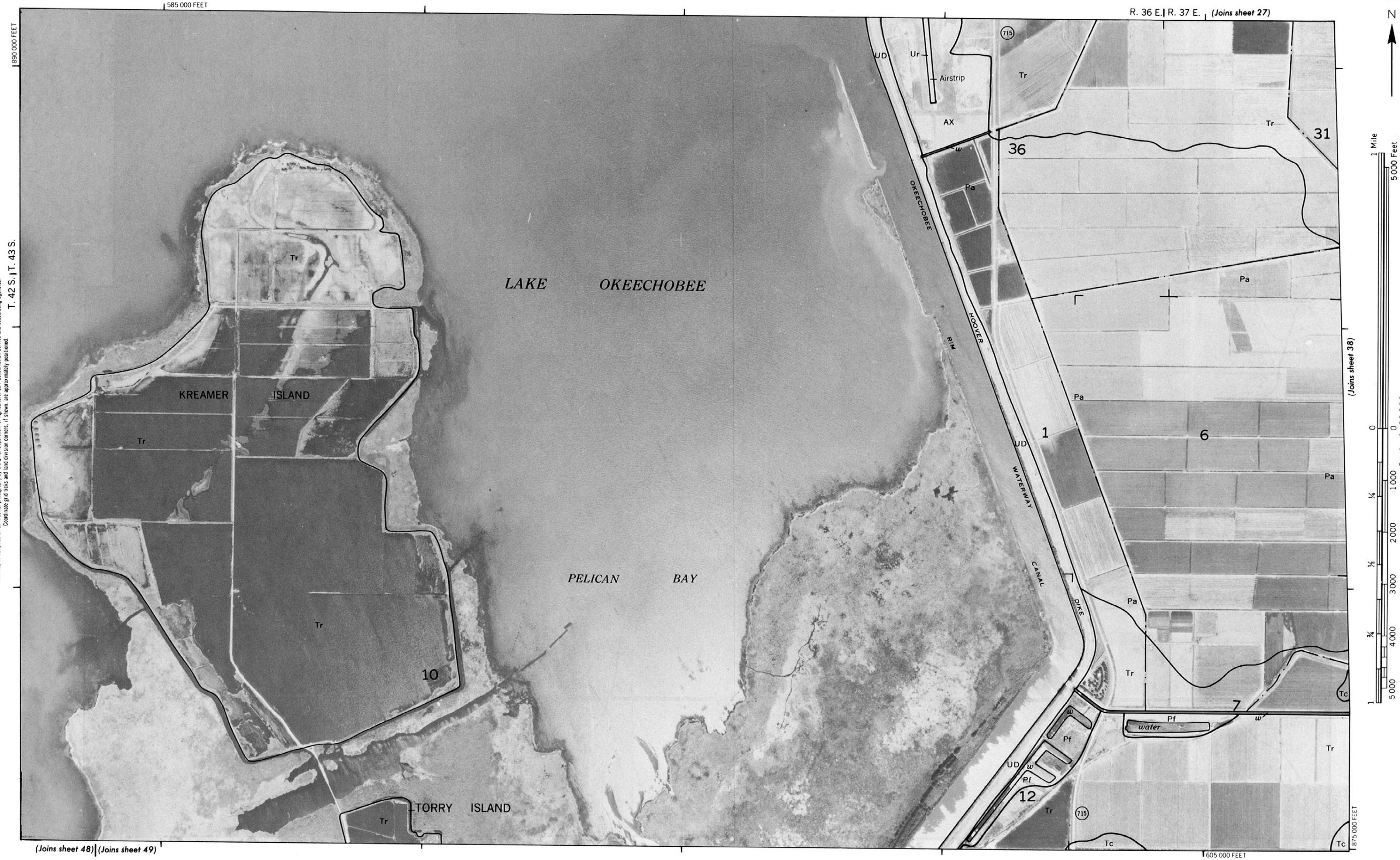

N
(Joins sheet 22)
R. 40 E.
720 000 FEET
905 000 FEET
CORBETT STATE WILDLIFE MANAGEMENT AREA
T. 42 S.
(Joins sheet 33)
(Joins sheet 41)
(Joins sheet 31)
890 000 FEET
(Joins sheet 42)
705 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
¼
½
¾
1
1000
2000
3000
4000
5000
18
17
16
15
14
19
20
21
22
23
30
29
28
27
26


(Joins sheet 23)
(Joins sheet 24)
(Joins sheet 32)
(Joins sheet 34)
(Joins sheet 43)
R. 40 E.
R. 41 E.
T. 42 S.
725 000 FEET
745 000 FEET
905 000 FEET
890 000 FEET
CORBETT STATE WILDLIFE MANAGEMENT AREA
N
1 Mile
5000 Feet
Scale 1:20000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 34


775 000 FEET
R. 42 E.
(Joins sheet 25)
N
905 000 FEET
T. 42 E.
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 45)
790 000 FEET
890 000 FEET
Palm Beach Gardens
Airstrip
SEABOARD
COAST
LINE
STATE
PARKWAY
SUNSHINE
MILITARY
TRAIL
LOXAHATCHEE
SLOUGH
water
QAB
809A
710
809
95
13
14
15
16
21
22
23
24
25
26
27
28
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000


N
(Joins sheet 26)
(Joins sheet 35)
(Joins sheet 46)
R. 43 E.
T. 42 S.
815 000 FEET
905 000 FEET
890 000 FEET
795 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
NORTH PALM BEACH
LAKE PARK
RIVIERA BEACH
Palm Beach Shores
Singers Island
Munyon Island
Little Munyon Island
LAKE WORTH
INTRACOASTAL
WATERWAY
ATLANTIC
OCEAN
FLORIDA
EAST
COAST
water
15
16
17
18
19
20
21
22
23
26
27
28
29
30
AU
Mu
Im
BM
Ur
Bc
QAB
SuB
PhB
PcB
Ba
Sa
On
Pg
An
ASF
Pf
ScB
Tc
Cc
CuB
TM
Bn
PbB
Mk
w



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

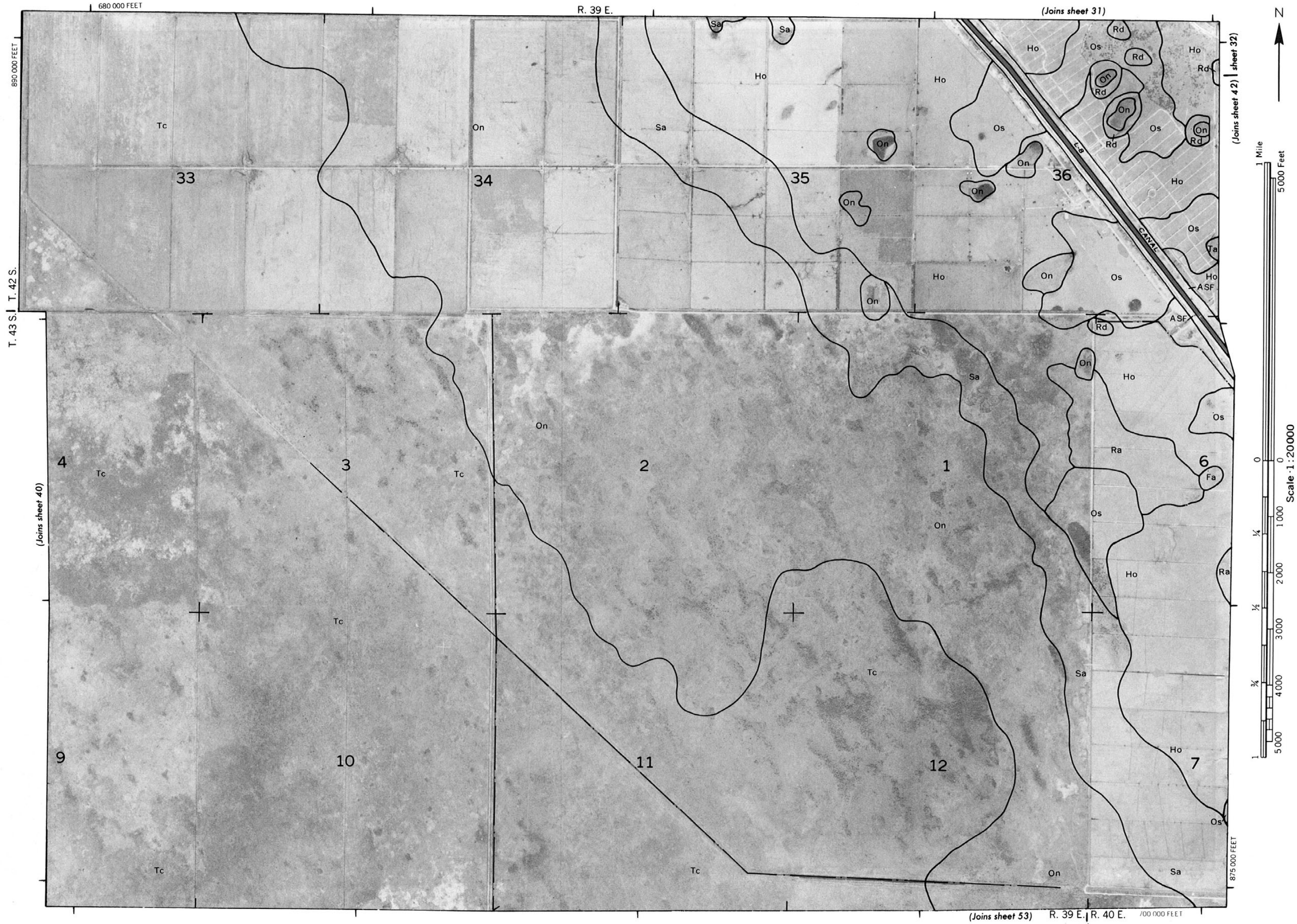
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 38

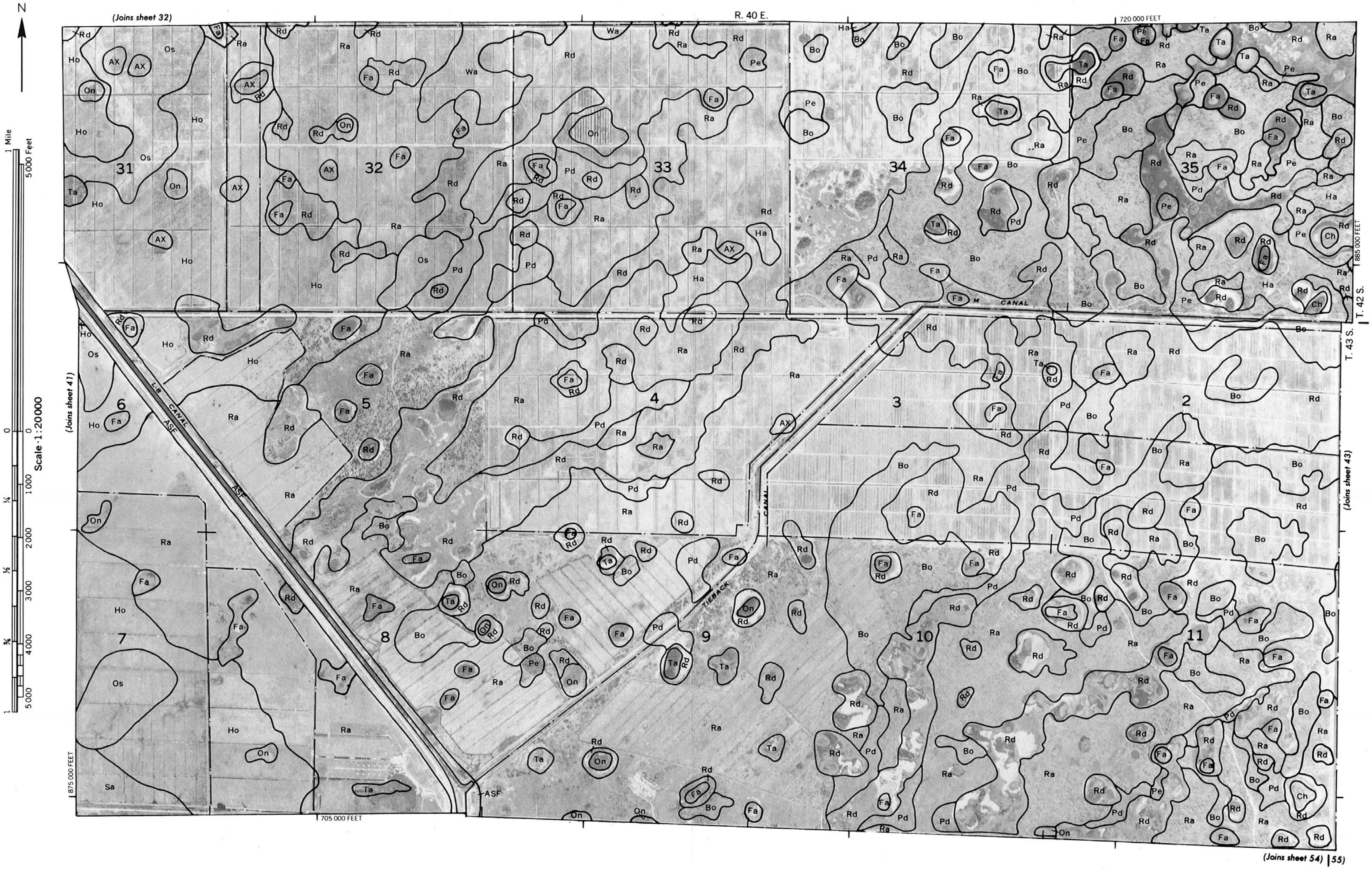
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 39

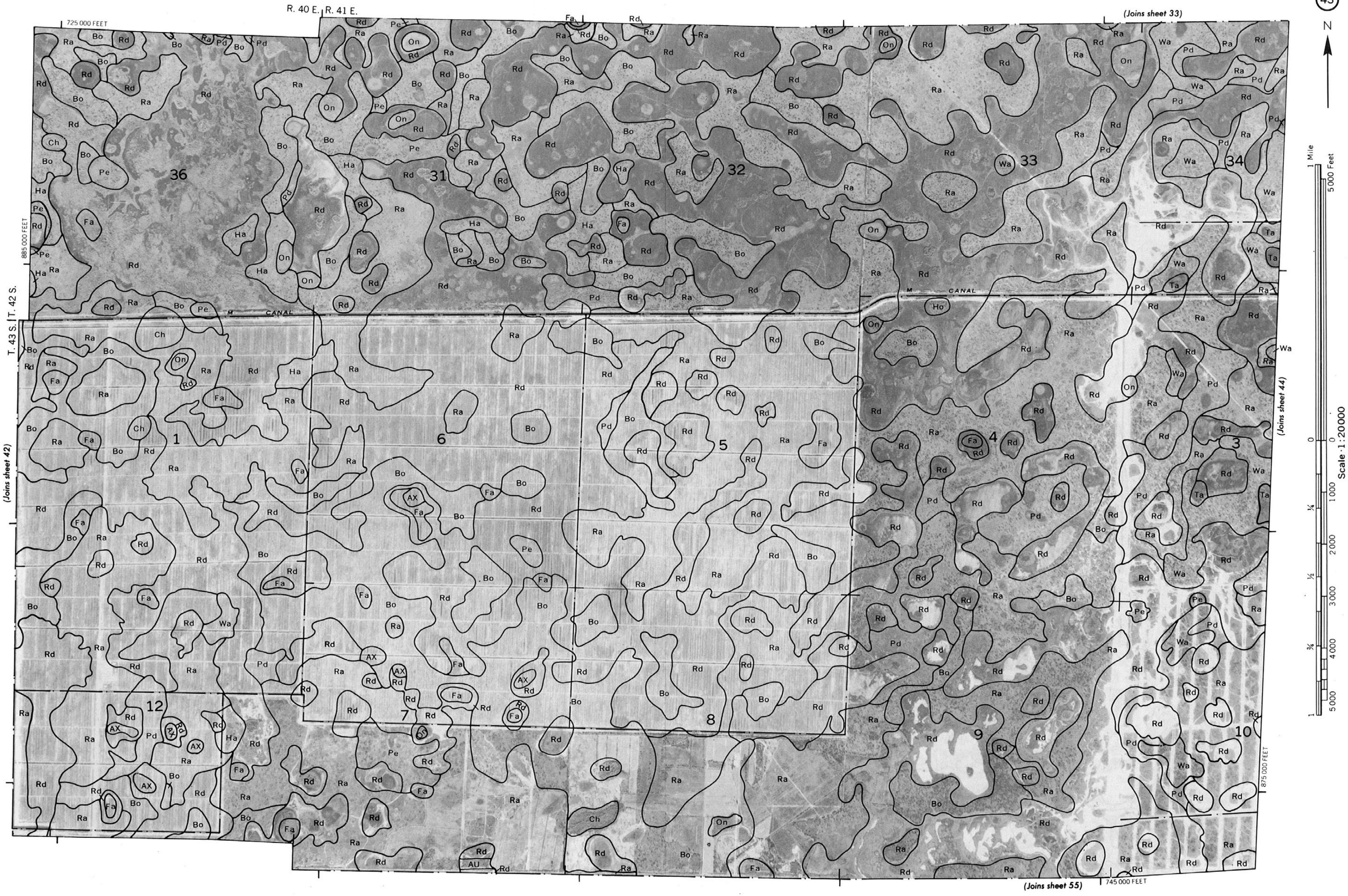
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 40

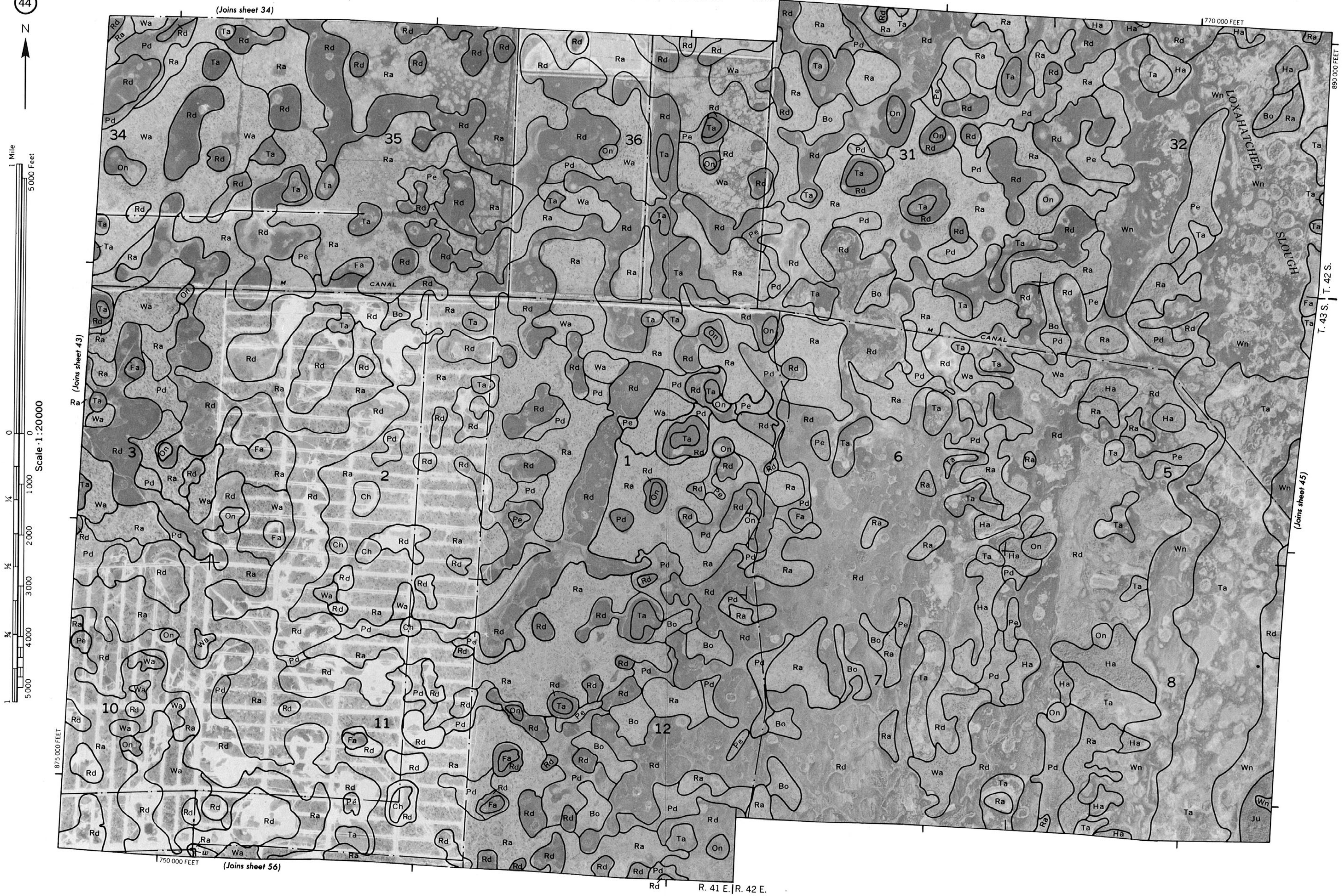
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 41

41

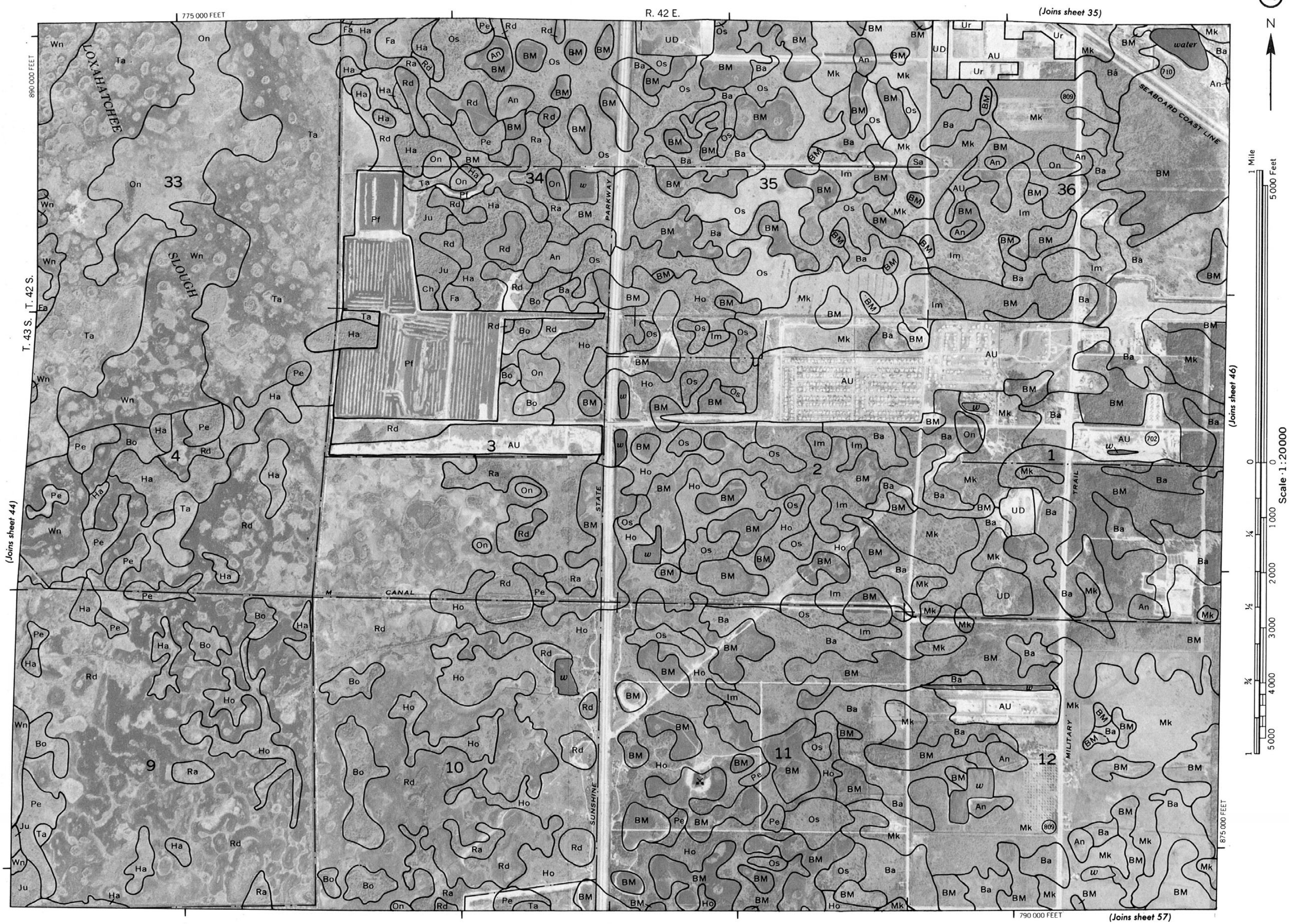



N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 32)
R. 40 E.
720 000 FEET
885 000 FEET
T. 42 S.
T. 43 S.
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 54)
55)
875 000 FEET
705 000 FEET
L-8 CANAL
M CANAL
TIEBACK CANAL
ASF
31
32
33
34
35
6
5
4
3
2
7
8
9
10
11

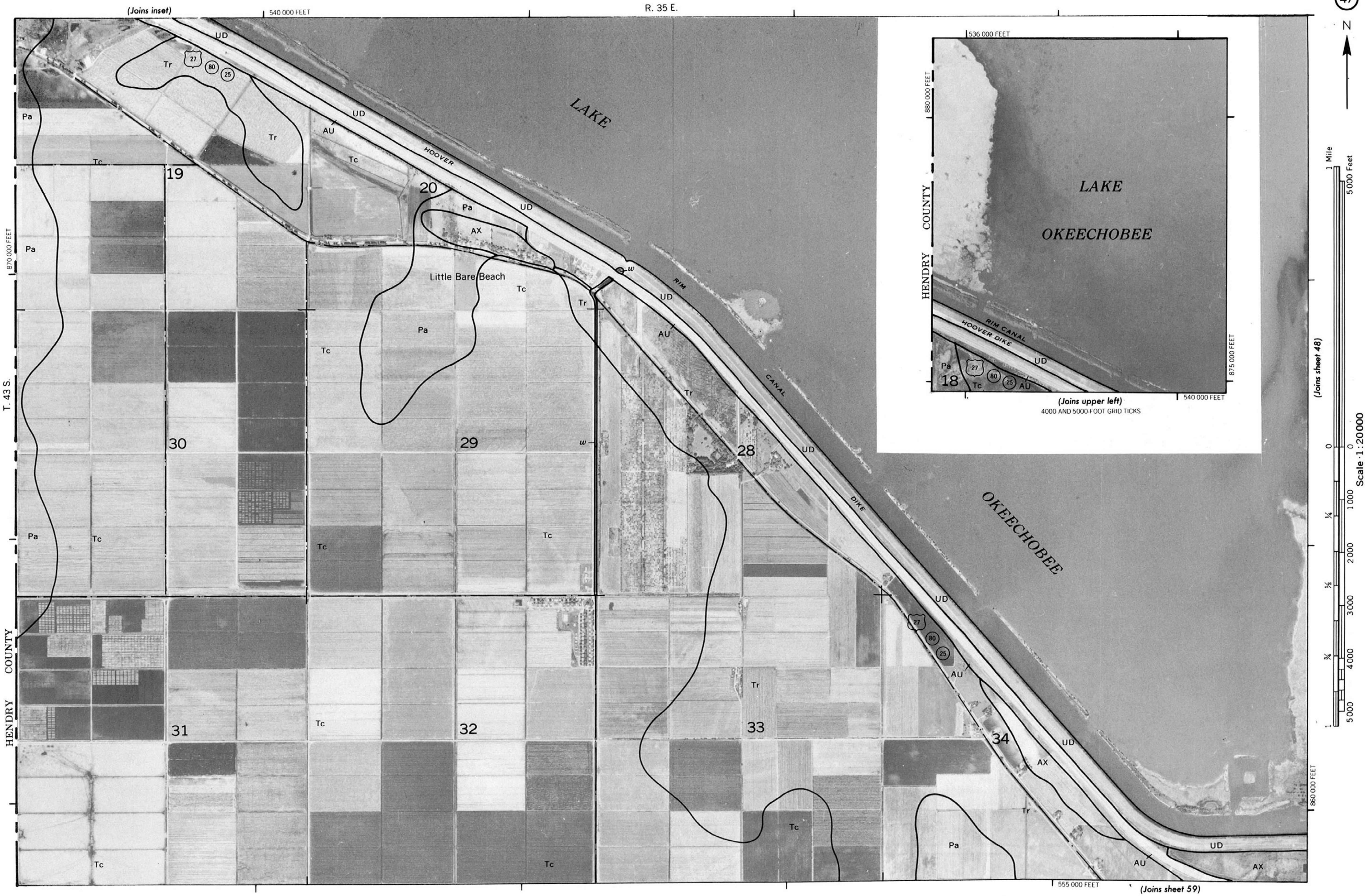

43
(Joins sheet 33)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 55)
R. 40 E. | R. 41 E.
T. 42 S. | T. 43 S.
725 000 FEET
885 000 FEET
875 000 FEET
745 000 FEET
M CANAL
N
1 Mile
5 000 Feet
Scale 1:20000
36
31
32
33
34
1
6
5
4
3
12
7
8
9
10


N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 34)
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 56)
770 000 FEET
890 000 FEET
875 000 FEET
750 000 FEET
LOXAHATCHEE SLOUGH
M CANAL
T. 42 S.
T. 43 S.
R. 41 E.
R. 42 E.

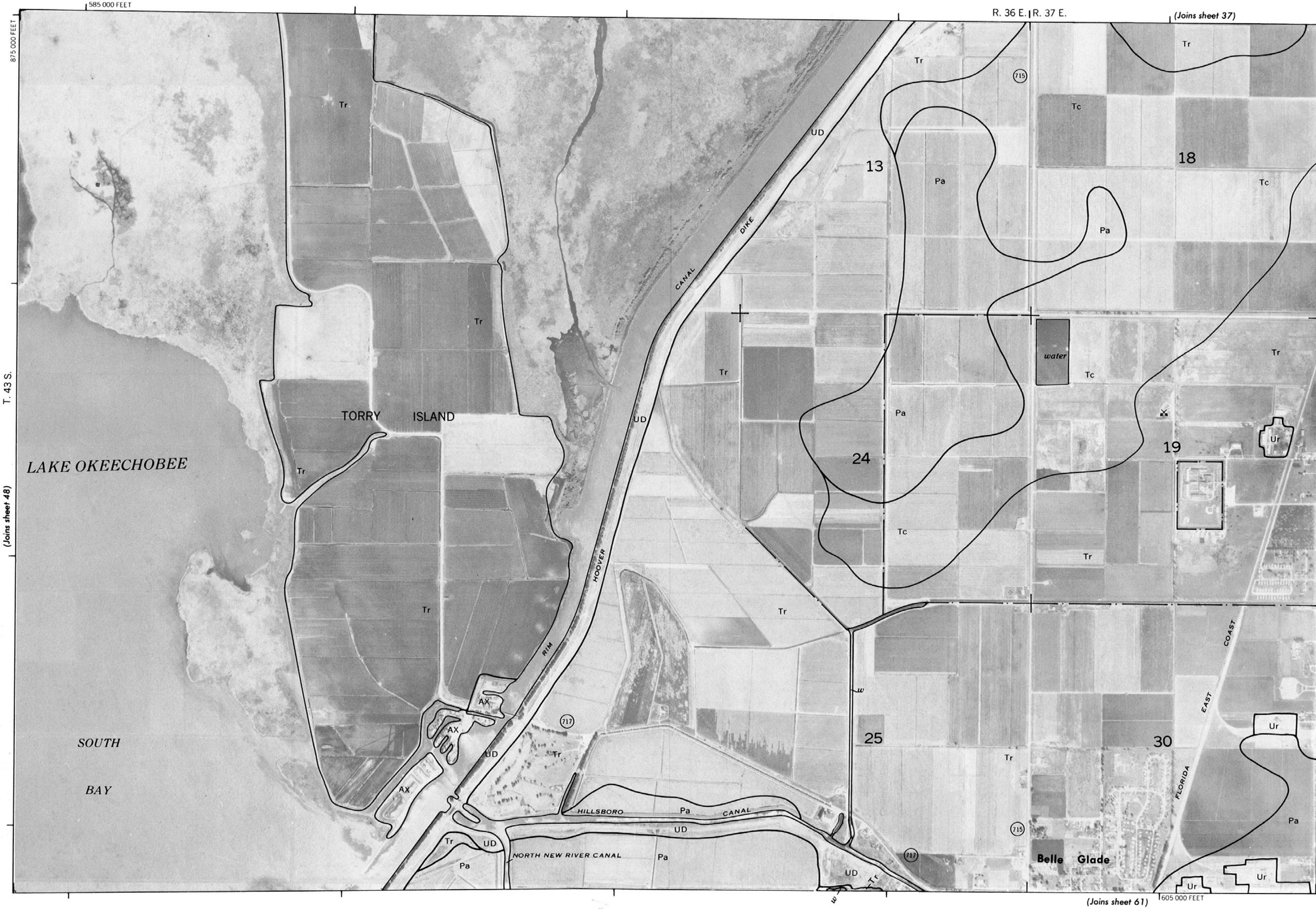
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 45




(Joins sheet 36)
R. 43 E.
815 000 FEET
N
1 Mile
5000 Feet
Scale 1:20 000
T. 43 S. T. 42 S.
(Joins sheet 45)
885 000 FEET
875 000 FEET
795 000 FEET
(Joins sheet 58)
Palm Beach Shores
Peanut Island
Singers Island
Lake Worth Inlet
RIVIERA BEACH
Mangonia Park
ATLANTIC
OCEAN
LAKE
WORTH
INTRACOASTAL WATERWAY
PALM BEACH
WEST PALM BEACH
Lake
Mangonia
FLORIDA
EAST
COAST
LINE
SEABOARD
COAST
LINE
CANAL
water


(Joins inset)
540 000 FEET
R. 35 E.
LAKE
OKEECHOBEE
HOOVER
RIM
CANAL
DIKE
Little Bare Beach
870 000 FEET
860 000 FEET
555 000 FEET
T. 43 S.
HENDRY COUNTY
(Joins sheet 48)
(Joins sheet 59)
19
20
28
29
30
31
32
33
34
UD
AU
AX
Pa
Tc
Tr
w
27
80
25
536 000 FEET
880 000 FEET
875 000 FEET
540 000 FEET
HENDRY COUNTY
LAKE OKEECHOBEE
RIM CANAL
HOOVER DIKE
18
(Joins upper left)
4000 AND 5000-FOOT GRID TICKS
N
1 Mile
5 000 Feet
0
¼
½
¾
1
1000
2000
3000
4000
5000
Scale 1:20000


48
N
R. 35 E.
R. 36 E.
580 000 FEET
(Joins sheet 37)
875 000 FEET
(Joins sheet 47)
(Joins sheet 49)
T. 43 S.
LAKE
OKEECHOBEE
Tr
23
RITTA ISLAND
26
25
Tr
HALIFAX BANKS
860 000 FEET
RIM
CANAL
HOOVER
UD
DIKE
UD
UD
AX
2
W
Tr
QAB
1
27
80
25
Tr
QAB
6
SOUTH BAY
560 000 FEET
(Joins sheet 60)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
0



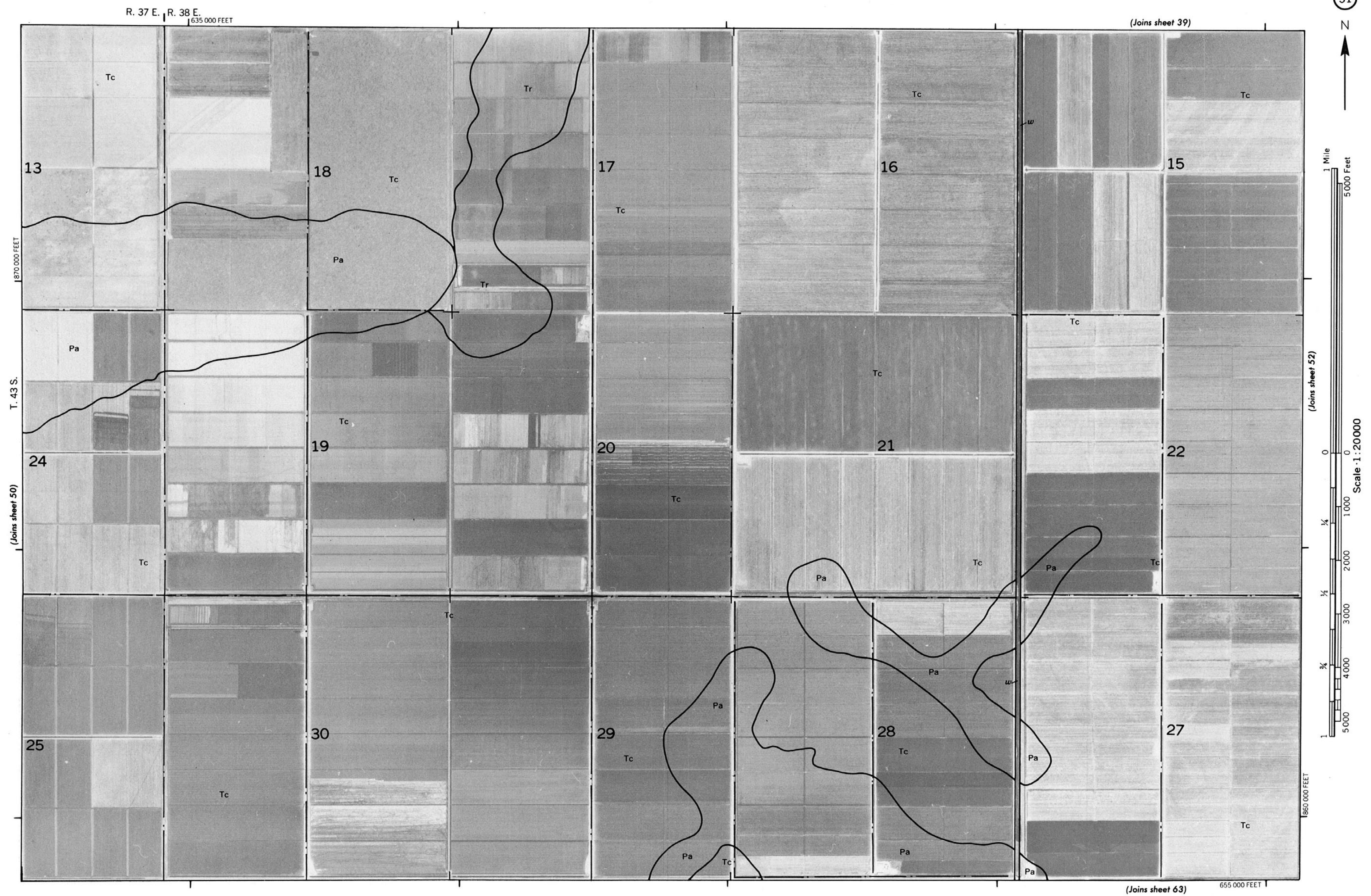
N

Scale 1:20000

1 Mile

5000 Feet

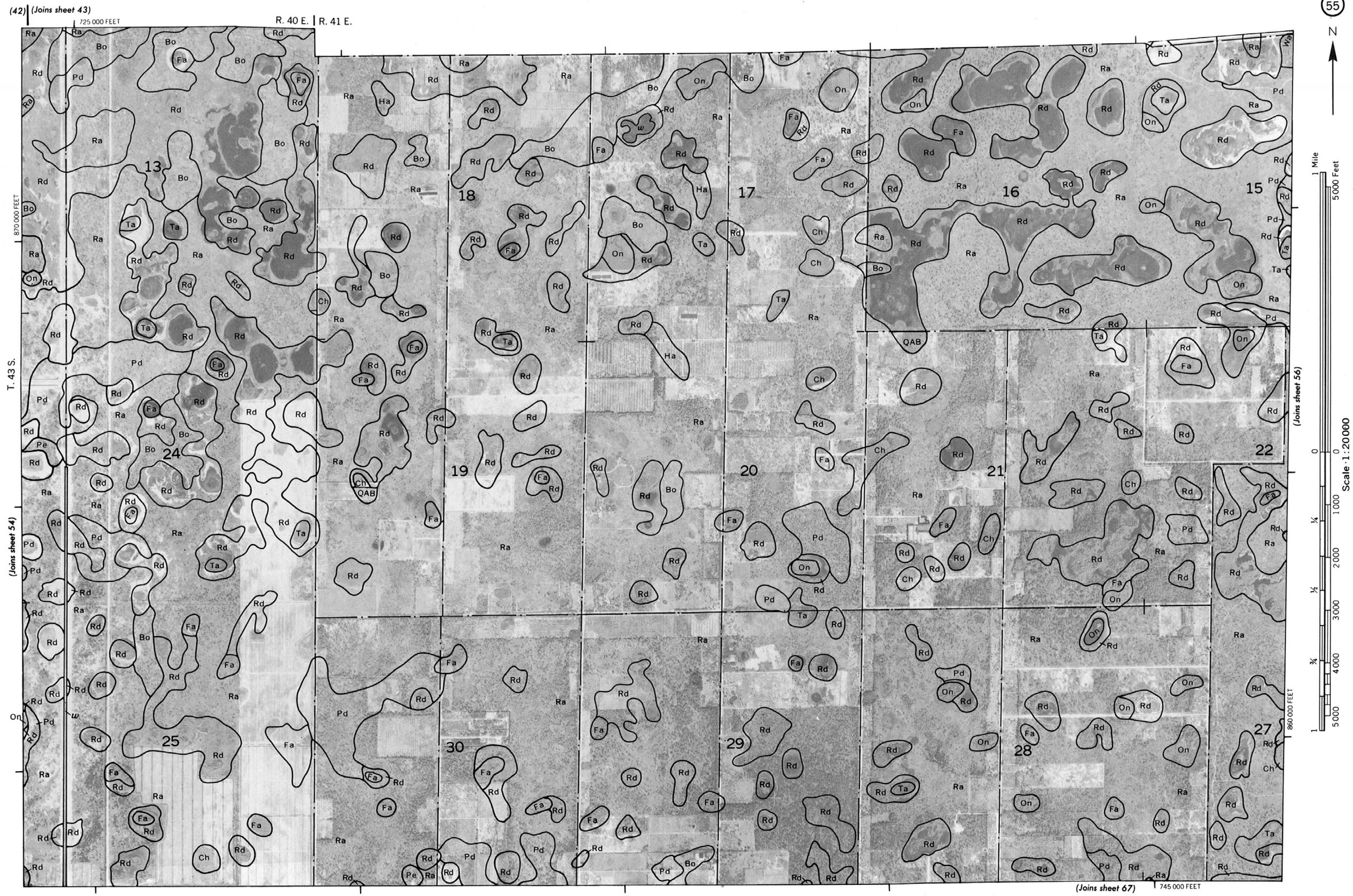

N
(Joins sheet 38)
R. 37 E.
635 000 FEET
870 000 FEET
T. 43 S.
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 62)
615 000 FEET
860 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
FLORIDA
EAST
COAST
441
15
BELLE GLADE
STATE AIRPORT
13
14
15
16
17
20
21
22
23
24
25
26
27
28
29
Tc
Tr
Ur
Pa
w

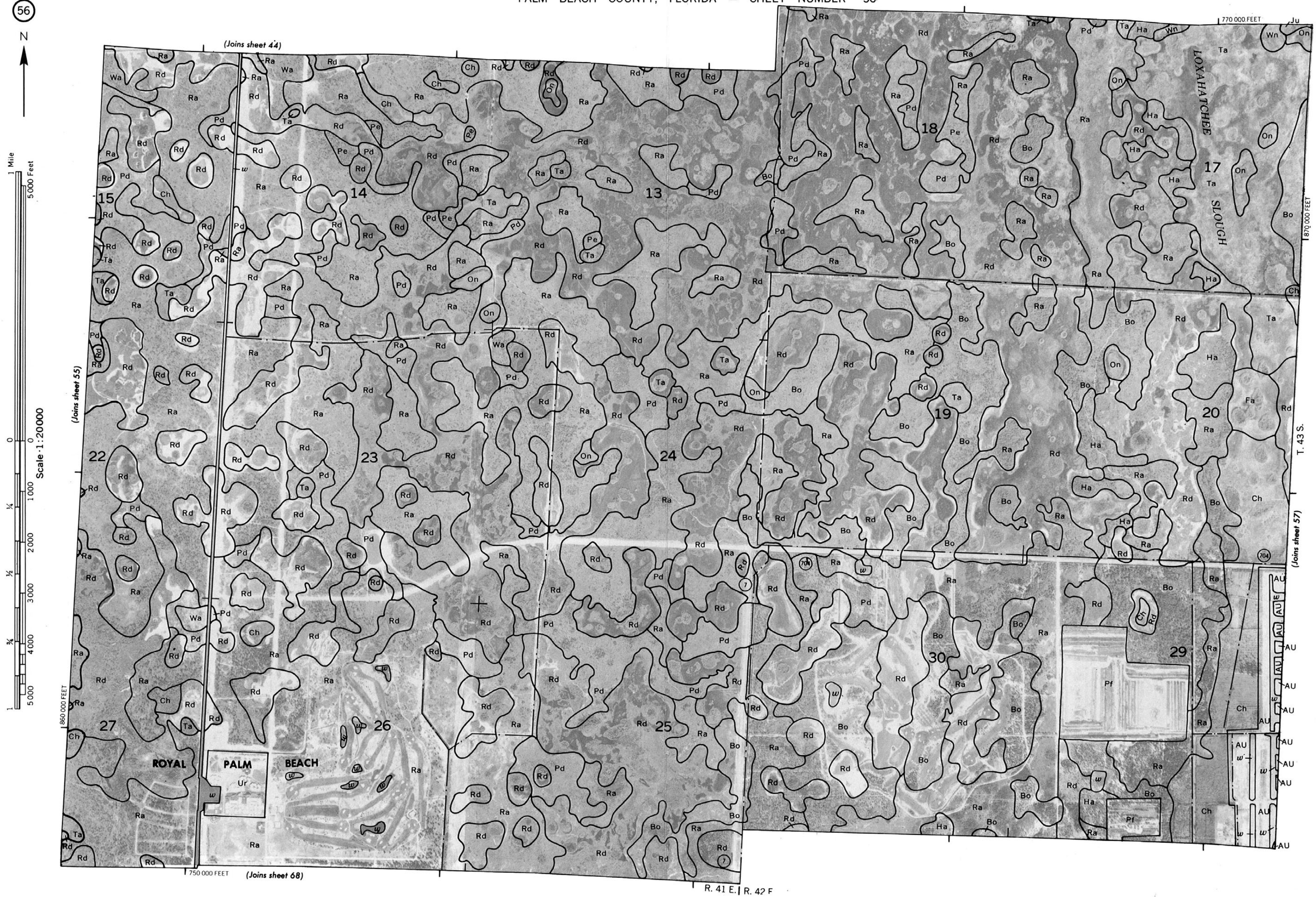

51
N
R. 37 E.
R. 38 E.
635 000 FEET
(Joins sheet 39)
(Joins sheet 52)
(Joins sheet 50)
(Joins sheet 63)
870 000 FEET
860 000 FEET
655 000 FEET
T. 43 S.
13
18
17
16
15
24
19
20
21
22
25
30
29
28
27
Tc
Tr
Pa
w
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

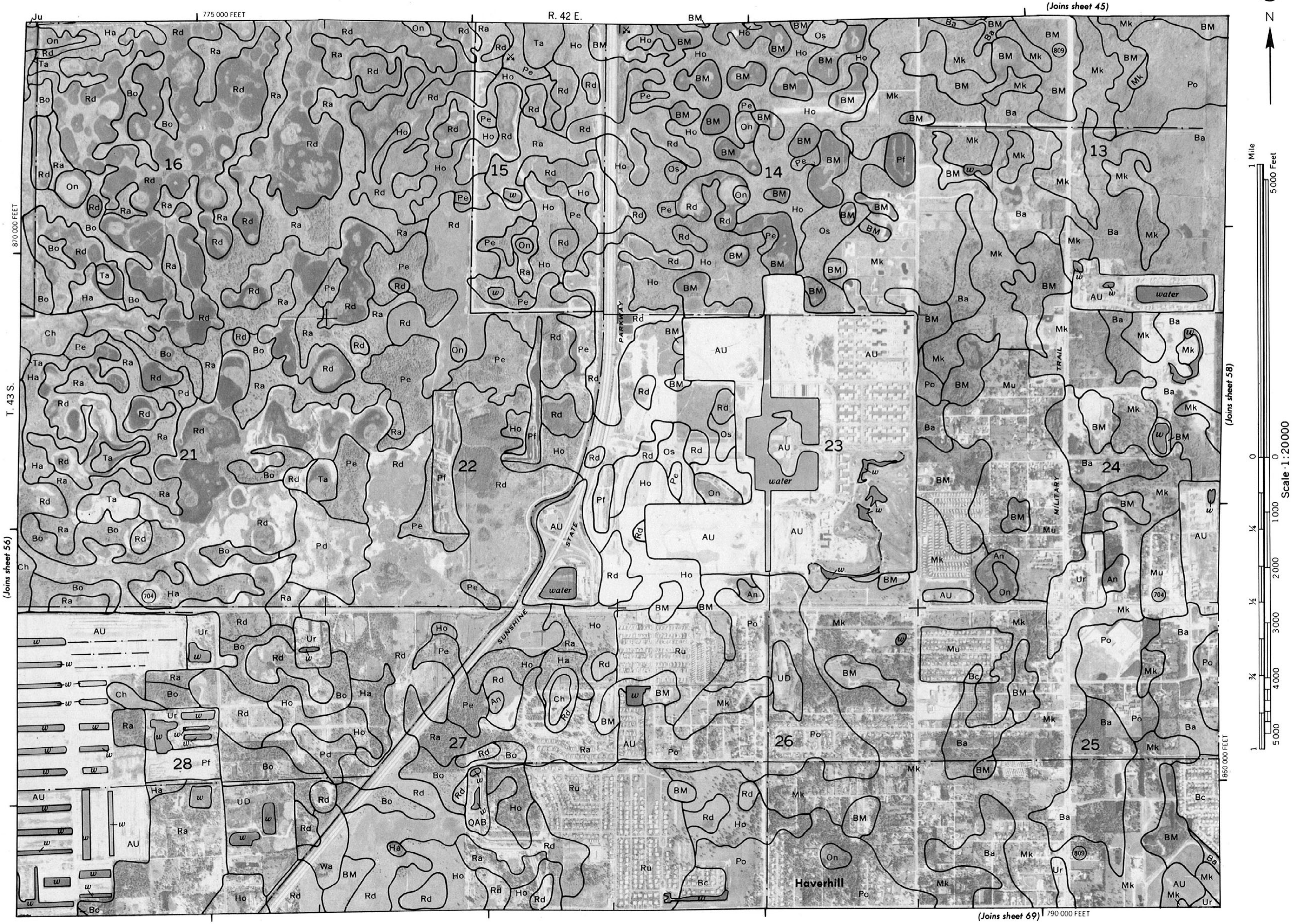
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 52

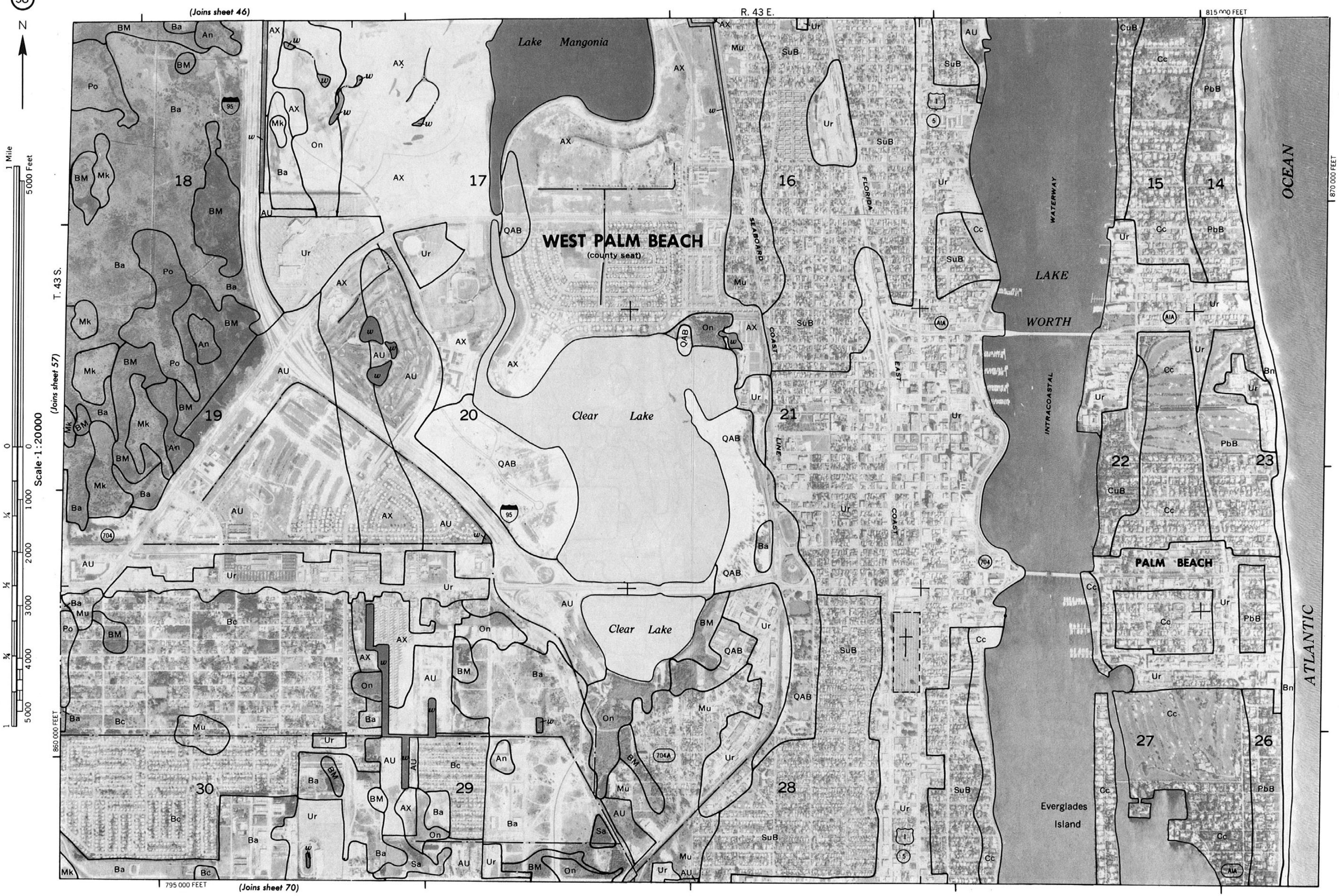
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 53


(Joins sheet 42)
(Joins sheet 53)
(Joins sheet 55)
(Joins sheet 66)
R. 40 E.
T. 43 S.
720 000 FEET
870 000 FEET
860 000 FEET
705 000 FEET
N
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
L-8 CANAL
ASF
14
15
16
17
18
19
20
21
22
23
26
27
28
29
30
Sa
Ho
Ta
Ra
On
Os
Oc
Rd
Fa
Pe
Pd
Bo
Ha
Ur


55
N
(42)
(Joins sheet 43)
725 000 FEET
R. 40 E.
R. 41 E.
870 000 FEET
T. 43 S.
(Joins sheet 54)
(Joins sheet 56)
860 000 FEET
(Joins sheet 67)
745 000 FEET
13
18
17
16
15
24
19
20
21
22
25
30
29
28
27
1 Mile
5000 Feet
Scale 1:20000

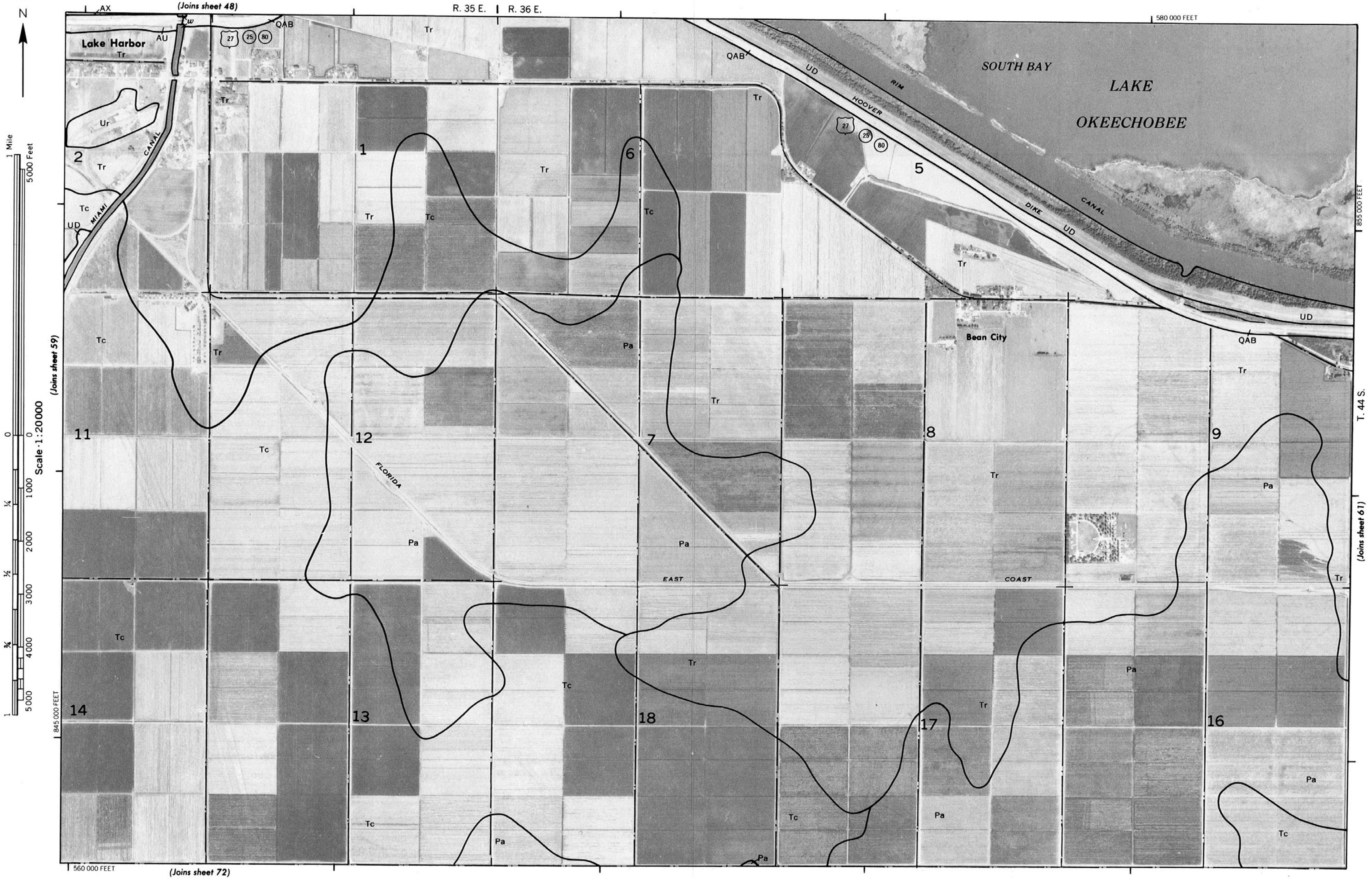

56
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
(Joins sheet 44)
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 68)
770 000 FEET
870 000 FEET
860 000 FEET
750 000 FEET
T. 43 S.
R. 41 E. | R. 42 E.
LOXAHATCHEE SLOUGH
ROYAL PALM BEACH
13
14
15
17
18
19
20
22
23
24
25
26
27
29
30


(Joins sheet 45)
775 000 FEET
R. 42 E.
870 000 FEET
T. 43 S.
(Joins sheet 56)
(Joins sheet 58)
(Joins sheet 69)
790 000 FEET
860 000 FEET
SUNSHINE STATE PARKWAY
MILITARY TRAIL
Haverhill
N
1 Mile
5000 Feet
Scale 1:20000

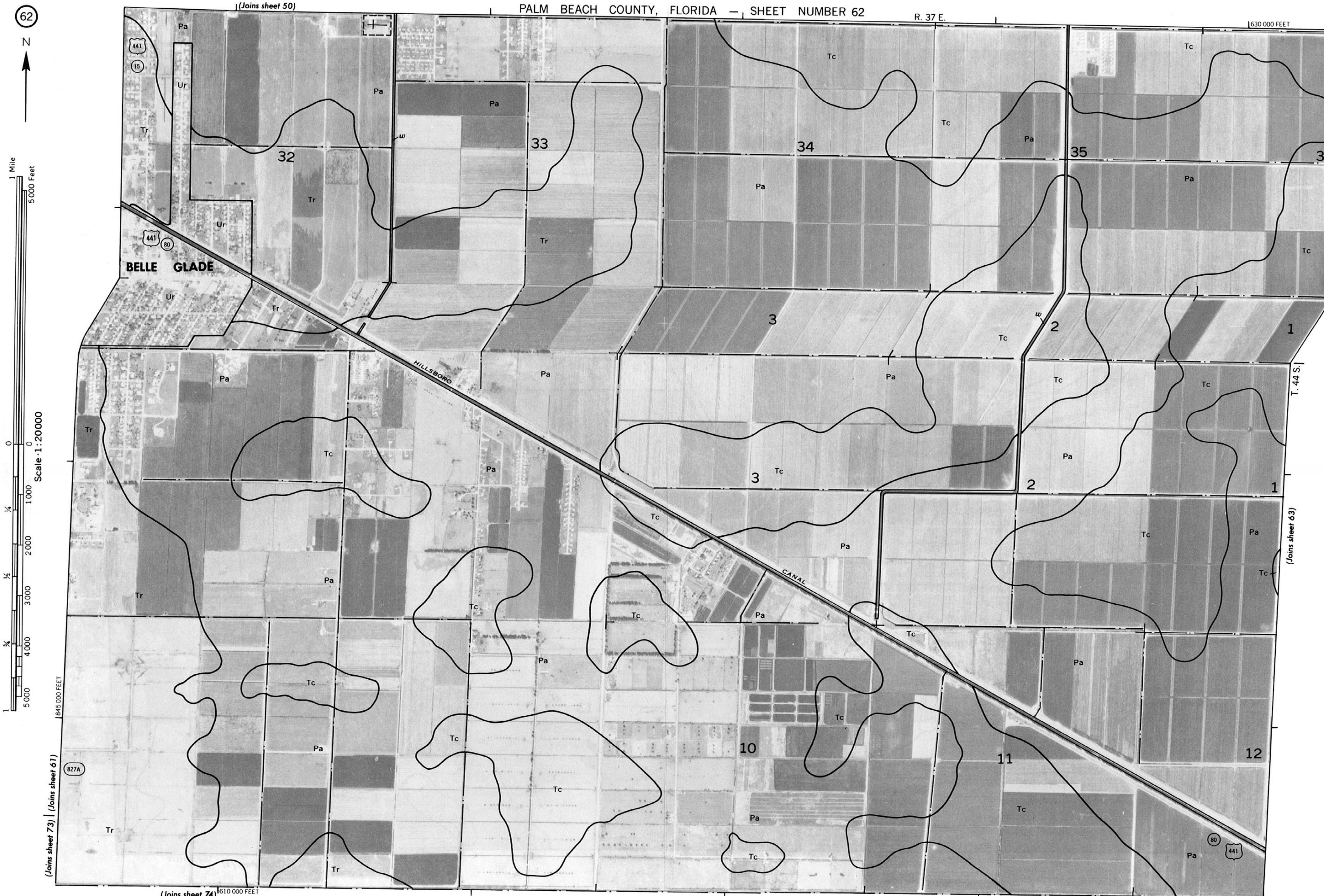

58
N
(Joins sheet 46)
R. 43 E.
815 000 FEET
870 000 FEET
T. 43 S.
(Joins sheet 57)
Scale 1:20000
1 Mile
5000 Feet
860 000 FEET
795 000 FEET
(Joins sheet 70)
Lake Mangonia
WEST PALM BEACH
(county seat)
Clear Lake
Clear Lake
LAKE
WORTH
INTRACOASTAL
WATERWAY
SEABOARD
COAST
LINE
FLORIDA
EAST
COAST
PALM BEACH
Everglades Island
ATLANTIC
OCEAN

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 59

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 60



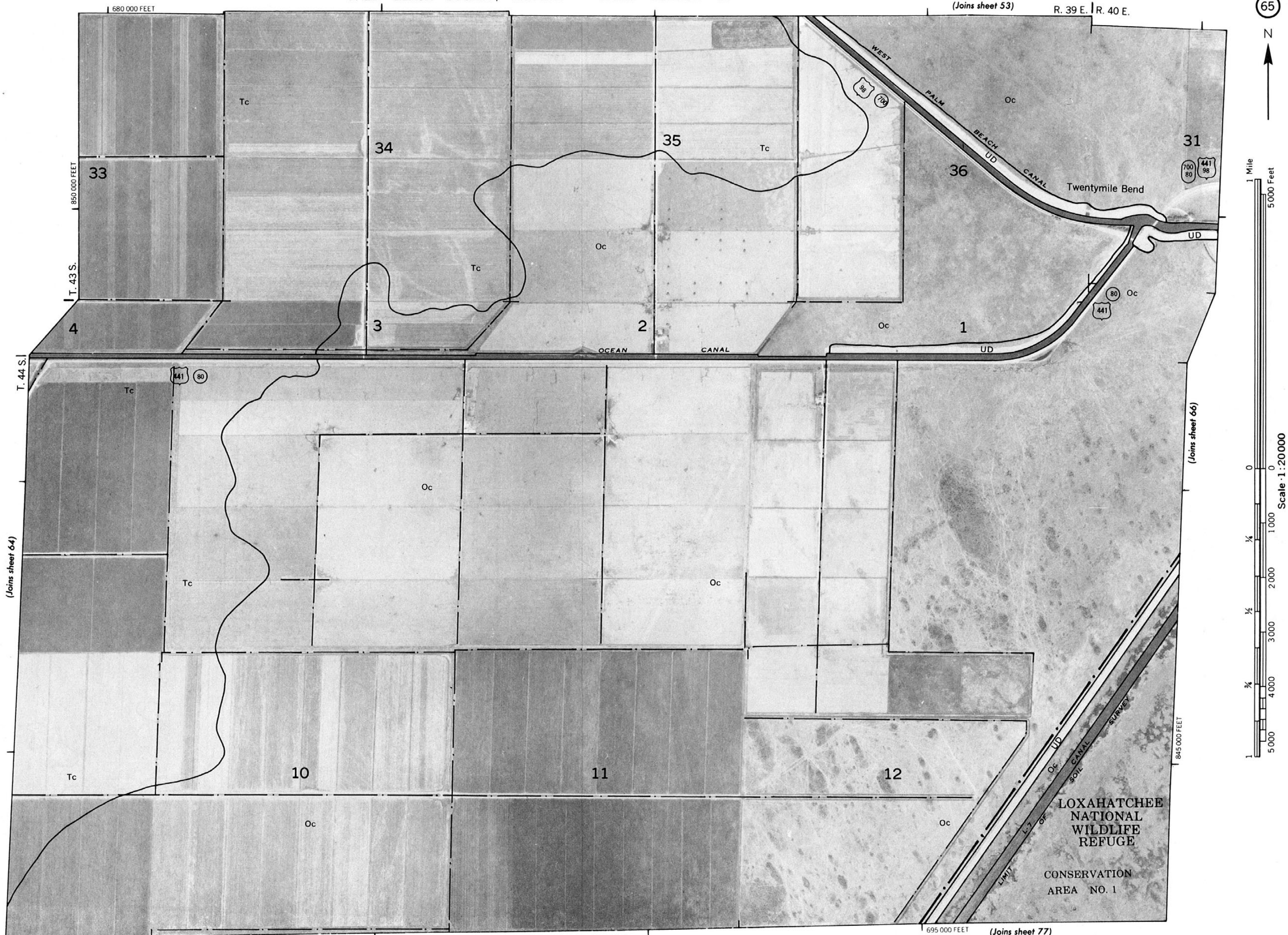

585 000 FEET
R. 36 E.
R. 37 E.
(Joins sheet 49)
N
SOUTH BAY
LAKE OKEECHOBEE
RIM HOOVER DIKE
CANAL
NORTH NEW RIVER CANAL
HILLSBORO CANAL
FLORIDA EAST COAST
BELLE GLADE
SOUTH BAY
855 000 FEET
T. 44 S.
T. 43 S.
(Joins sheet 60)
(Joins sheet 62)
(Joins sheet 73)
845 000 FEET
605 000 FEET
1
36
31
10
11
12
15
14
13
UD
QAB
Pa
Tr
Pf
Da
AX
Ur
Tc
water
w
27
25
80
15
441
715
717
827 A
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

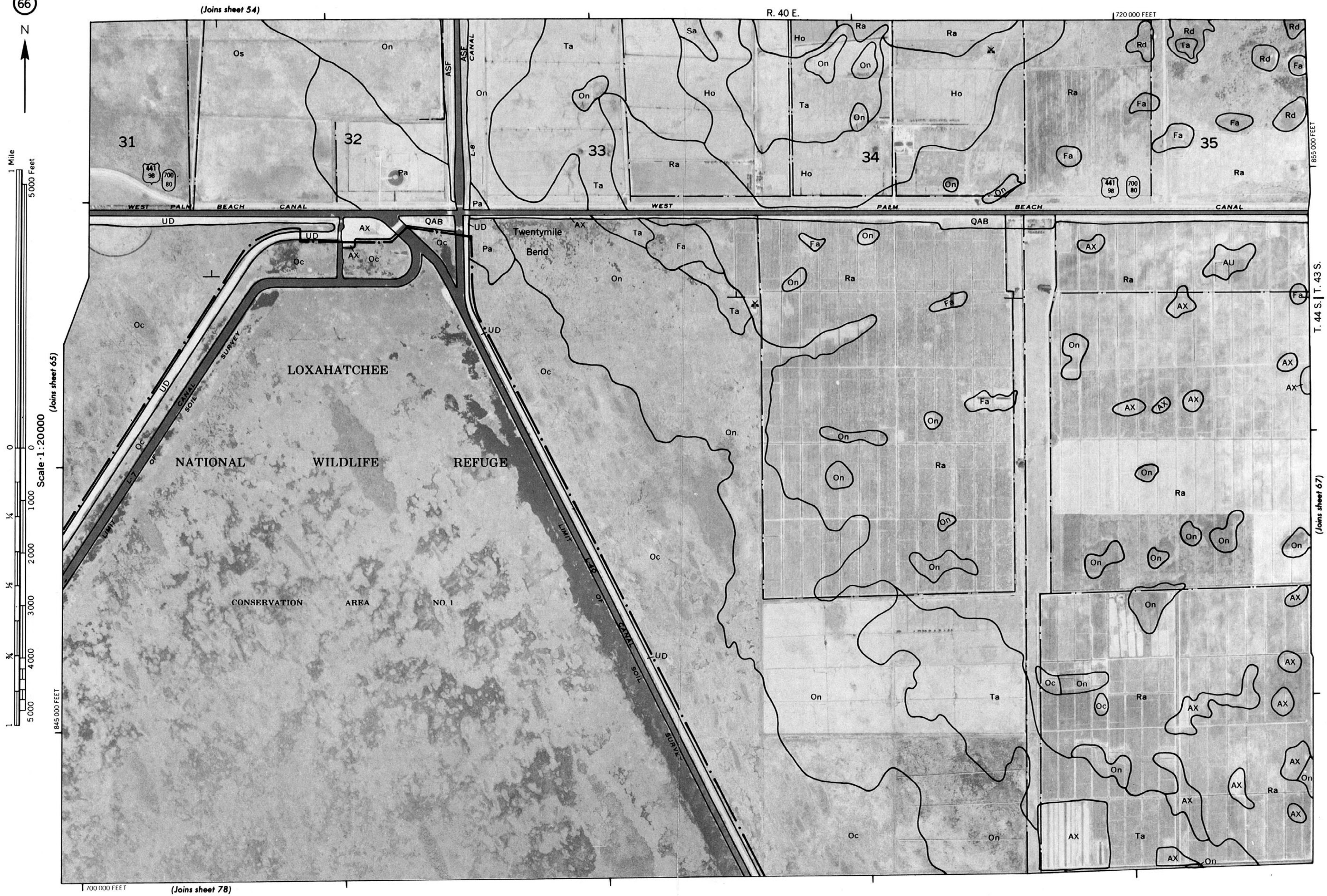

62
N
(Joins sheet 50)
R. 37 E.
630 000 FEET
855 000 FEET
T. 43 S.
T. 44 S.
(Joins sheet 63)
(Joins sheet 61)
(Joins sheet 73)
(Joins sheet 74)
610 000 FEET
845 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
BELLE GLADE
HILLSBORO
CANAL
441
15
80
827A
Pa
Ur
Tr
Tc
w
32
33
34
35
36
3
2
1
10
11
12

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 63


64
N
(Joins sheet 52)
675 000 FEET
Tc
35
2
36
1
OCEAN
31
6
32
5
Pa
CANAL
33
4
855 000 FEET
T. 43 S.
T. 44 S.
441
80
(Joins sheet 63)
(Joins sheet 65)
Pa
Oc
w
845 000 FEET
655 000 FEET
(Joins sheet 76)
R. 38 E.
R. 39 E.
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000

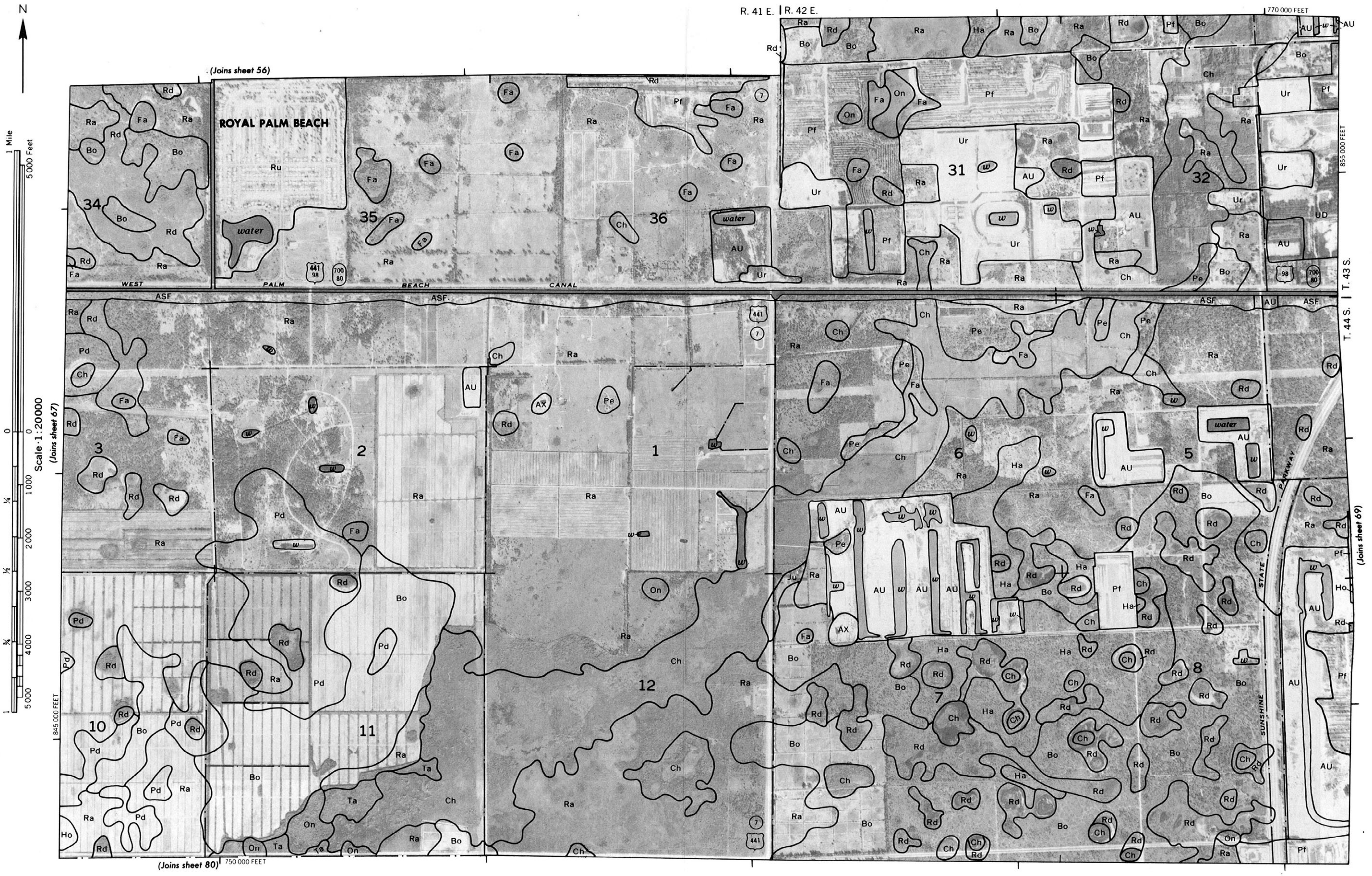
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 65

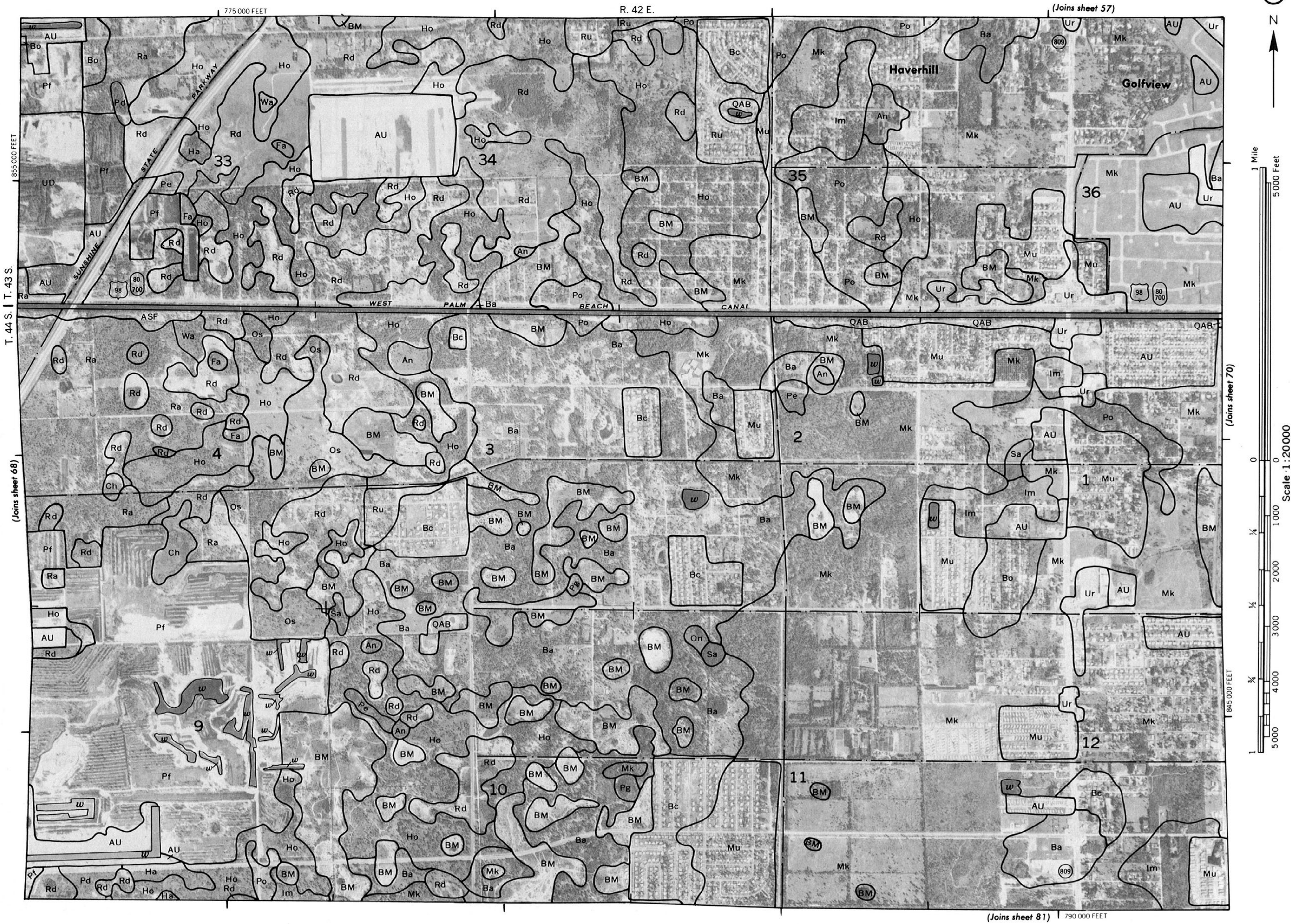


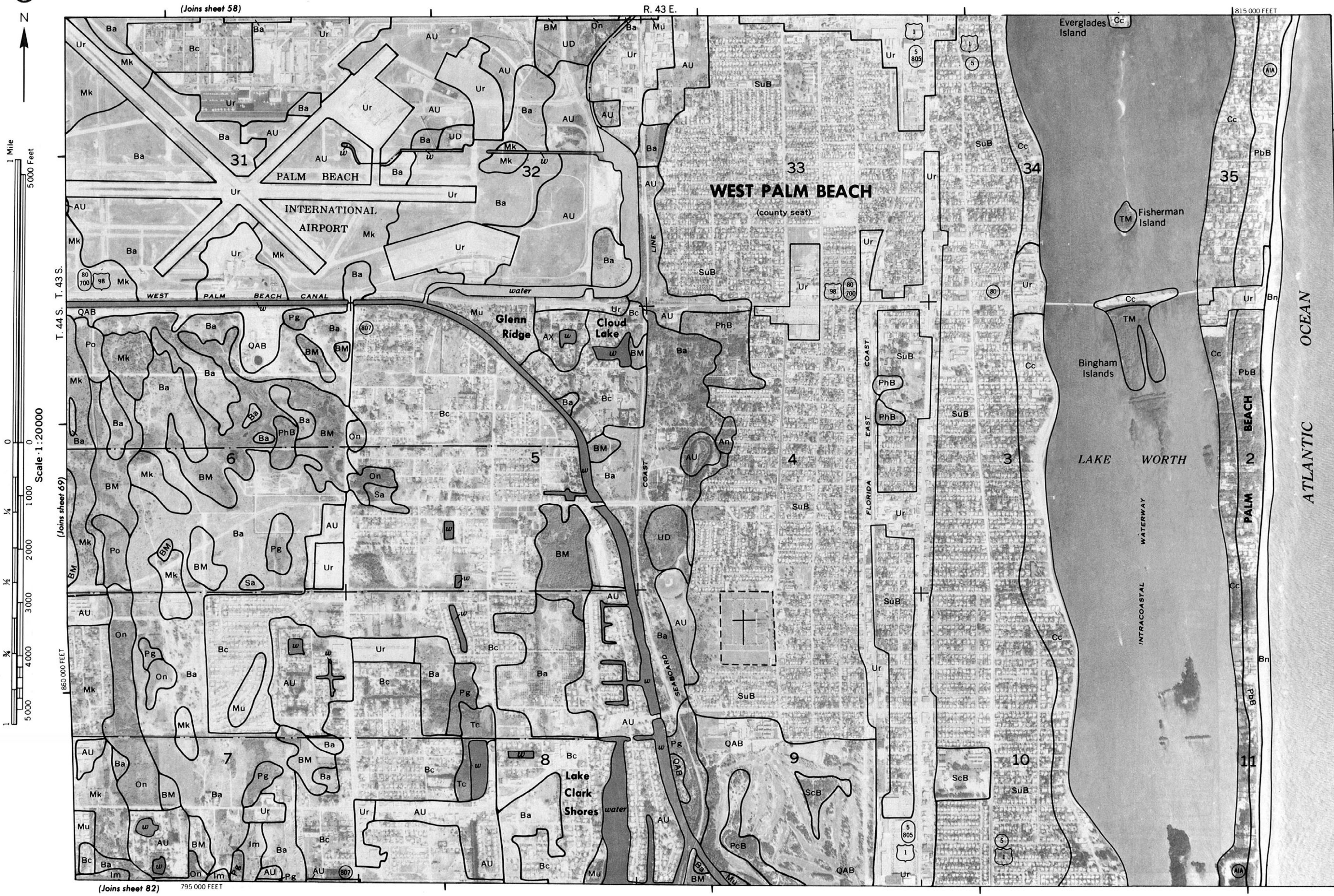

66
N
(Joins sheet 54)
(Joins sheet 65)
(Joins sheet 67)
(Joins sheet 78)
R. 40 E.
720 000 FEET
855 000 FEET
845 000 FEET
700 000 FEET
T. 44 S. | T. 43 S.
Scale 1:20000
1 Mile
5000 Feet
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000
31
32
33
34
35
WEST PALM BEACH CANAL
ASF CANAL
L-8
Twentymile Bend
LOXAHATCHEE
NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
LIMIT OF SOIL SURVEY
L-7 CANAL
L-40 CANAL
Os
On
Oc
Ta
Ho
Ra
Rd
Fa
Sa
Pa
Ha
AX
AU
UD
QAB


67
N
(Joins sheet 55)
725 000 FEET
R. 40 E.
R. 41 E.
855 000 FEET
T. 44 S. | T. 43 S.
(Joins sheet 66)
(Joins sheet 68)
(Joins sheet 79)
745 000 FEET
845 000 FEET
WEST PALM BEACH CANAL
36
31
32
33
34
3
10
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 68

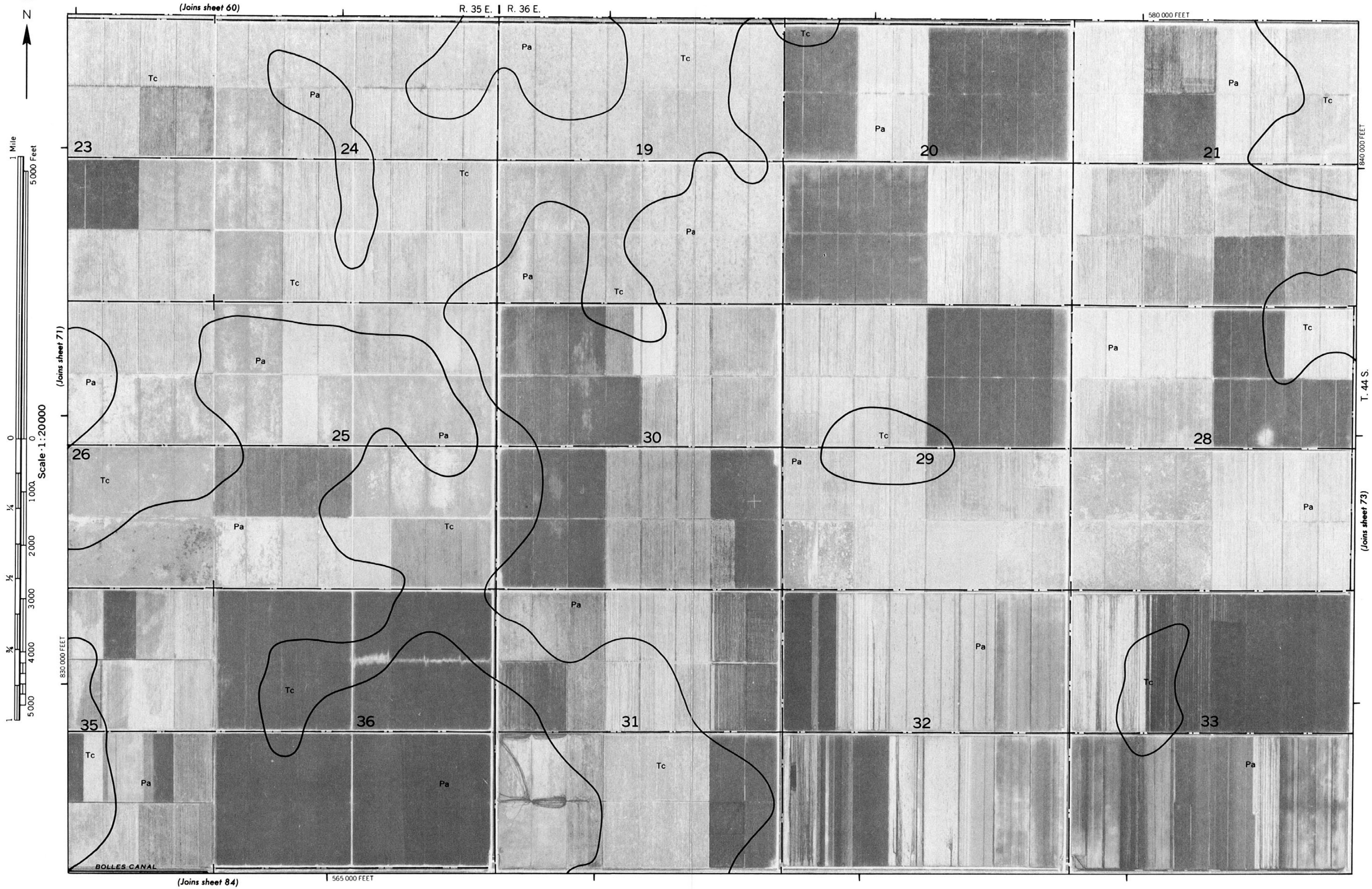



775 000 FEET
R. 42 E.
(Joins sheet 57)
N
855 000 FEET
T. 43 S.
T. 44 S.
(Joins sheet 68)
(Joins sheet 70)
SUNSHINE STATE PARKWAY
WEST PALM BEACH CANAL
Haverhill
Golfview
33
34
35
36
4
3
2
1
9
10
11
12
845 000 FEET
(Joins sheet 81)
790 000 FEET
1 Mile
5 000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

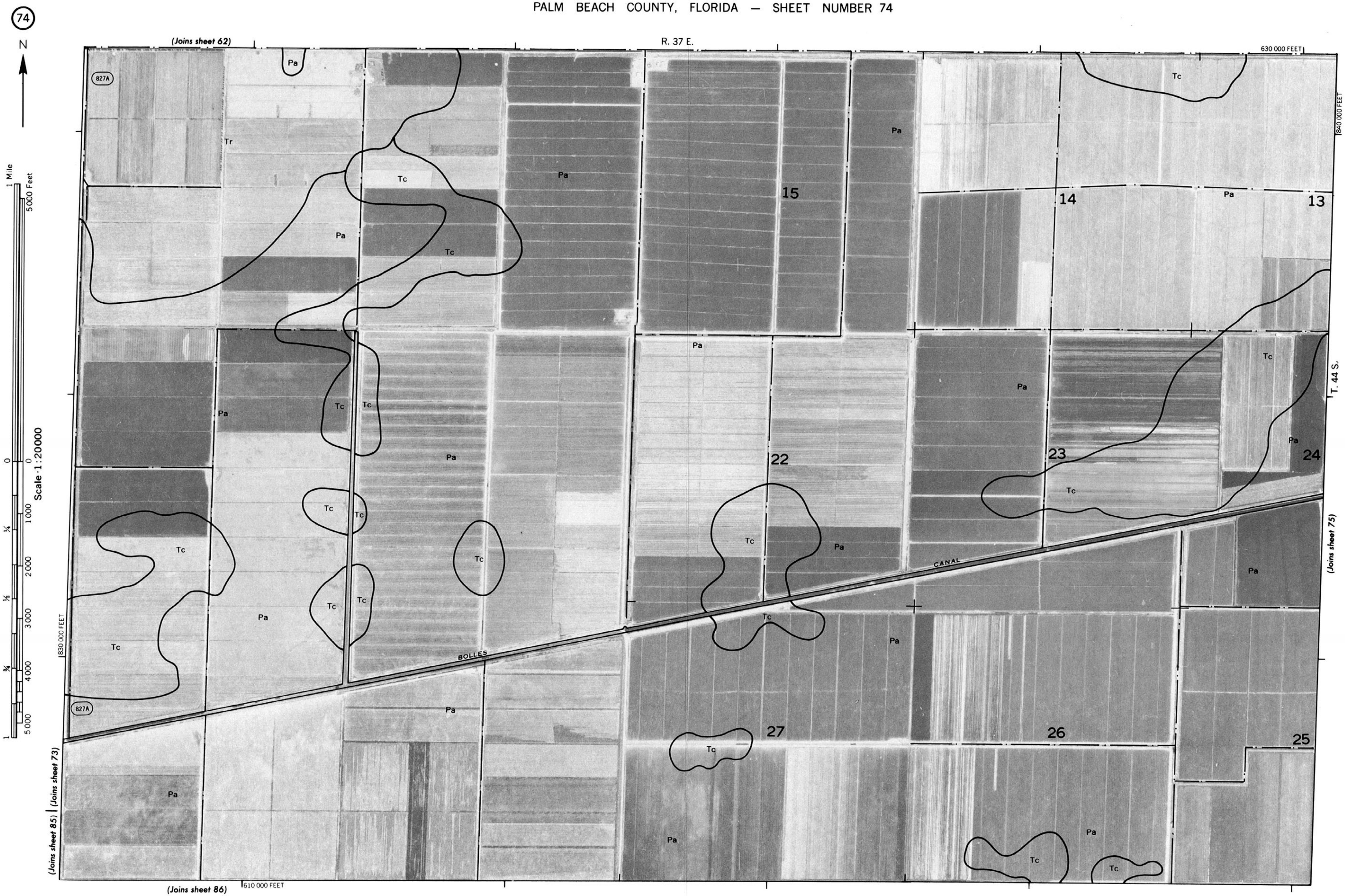

N
(Joins sheet 58)
R. 43 E.
815 000 FEET
855 000 FEET
(Joins sheet 69)
(Joins sheet 82)
795 000 FEET
860 000 FEET
T. 43 S.
T. 44 S.
1 Mile
5 000 Feet
Scale 1:20 000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
PALM BEACH
INTERNATIONAL
AIRPORT
WEST PALM BEACH CANAL
water
Glenn Ridge
Cloud Lake
Lake Clark Shores
WEST PALM BEACH
(county seat)
LINE
COAST
SEABOARD
FLORIDA EAST COAST
Everglades Island
Fisherman Island
Bingham Islands
LAKE WORTH
INTRACOASTAL WATERWAY
PALM BEACH
ATLANTIC OCEAN
31
32
33
34
35
6
5
4
3
2
7
8
9
10
11


540 000 FEET
R. 35 E.
(Joins sheet 59)
840 000 FEET
T. 44 S.
HENDRY COUNTY
(Joins sheet 72)
830 000 FEET
(Joins sheet 83)
560 000 FEET
SEABOARD COAST LINE
MIAMI CANAL
BOLLES CANAL
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
On
Sa
La
Pa
Tc
UD
N
1 Mile
5000 Feet
Scale 1:20000

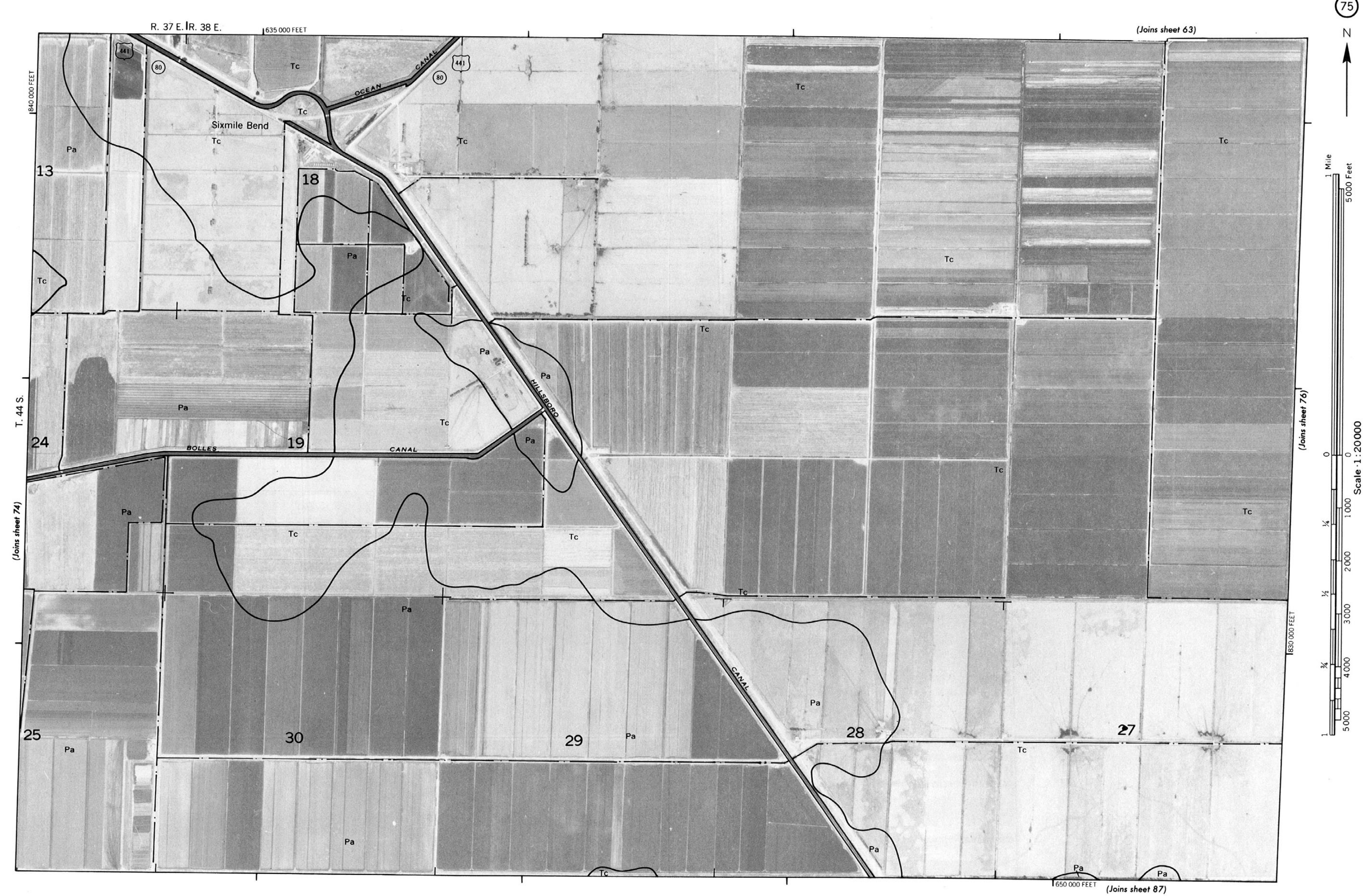
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 72




73
585 000 FEET
R. 36 E.
R. 37 E.
(Joins sheet 61)
(Joins sheet 62)
(Joins sheet 74)
840 000 FEET
T. 44 S.
(Joins sheet 72)
(Joins sheet 85)
605 000 FEET
830 000 FEET
water
water
water
water
Tr
Tc
Pa
22
23
24
25
26
27
34
35
36
27
25
827 A
NORTH NEW RIVER CANAL
BOLLES CANAL
N
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

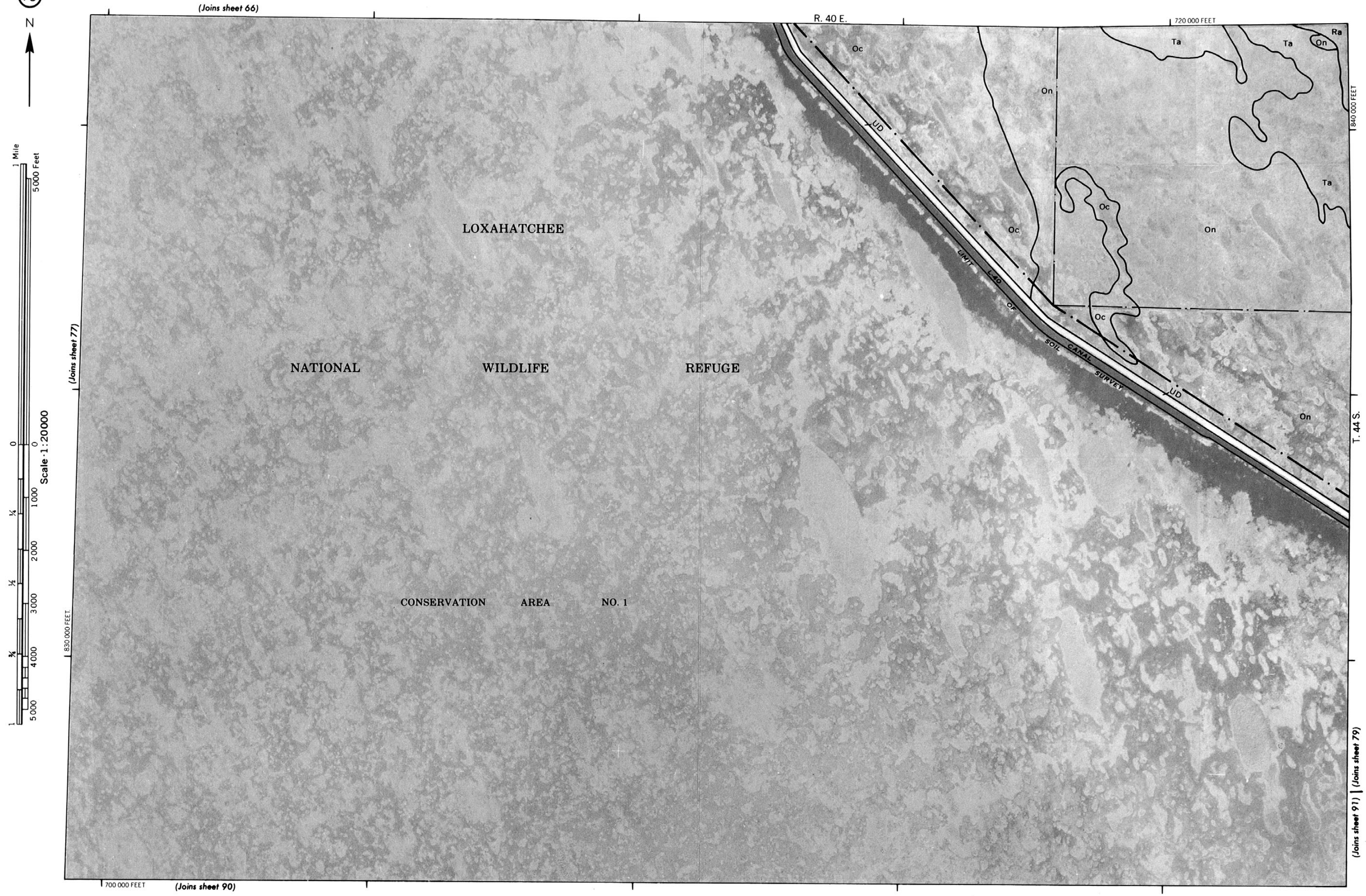

74
N
Scale 1:20000
1 Mile
5000 Feet
(Joins sheet 62)
R. 37 E.
630 000 FEET
840 000 FEET
T. 44 S.
(Joins sheet 75)
(Joins sheet 73)
(Joins sheet 85)
(Joins sheet 86)
610 000 FEET
830 000 FEET
827A
BOLLES
CANAL
15
14
13
22
23
24
27
26
25
Pa
Tc
Tr

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 75



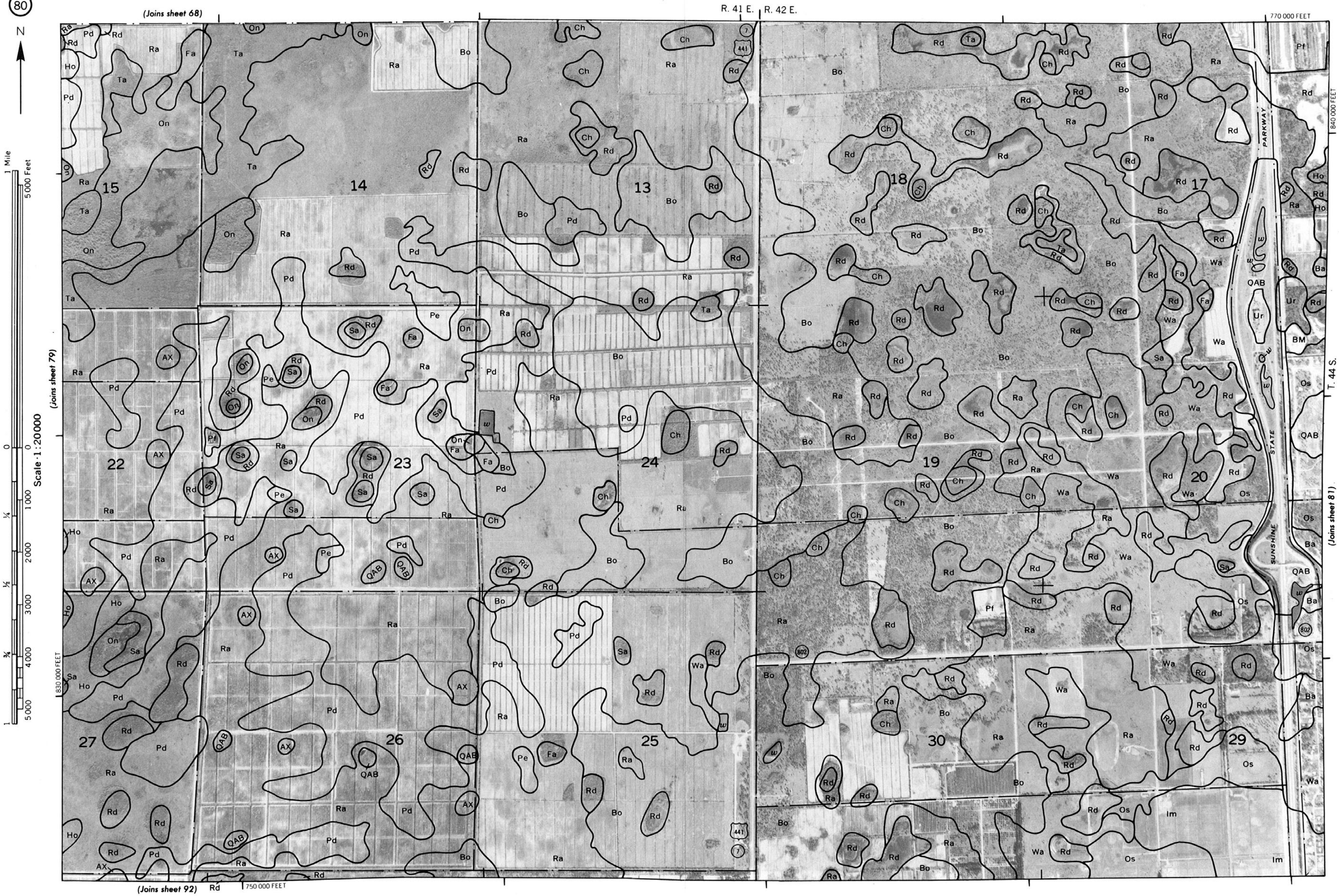
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 76

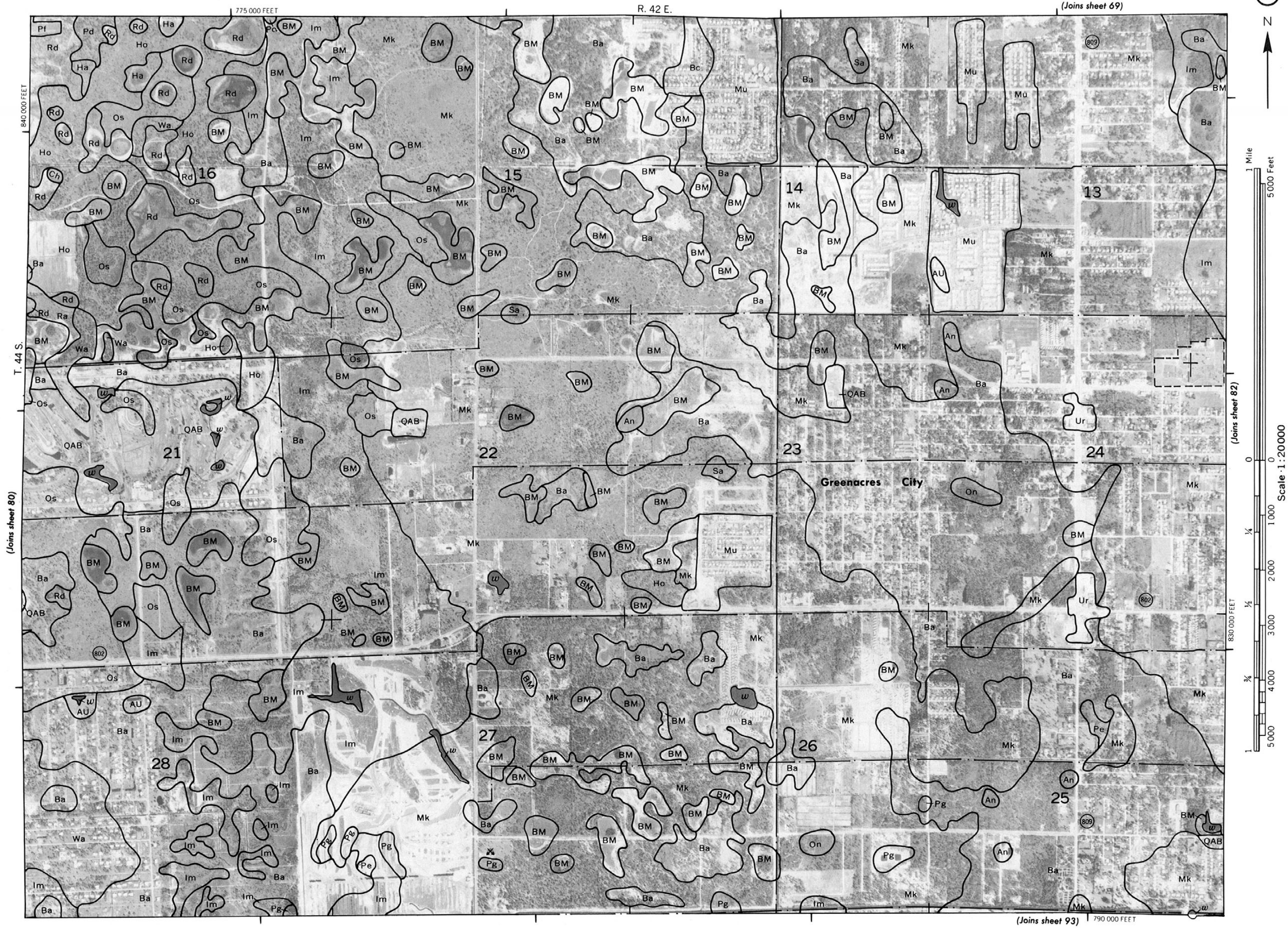

77
N
(Joins sheet 65)
680 000 FEET
R. 39 E.
840 000 FEET
Oc
15
14
Oc
UD
L-7
CANAL
LIMIT OF SOIL SURVEY
Oc
Oc
Oc
Oc
T. 44 S.
LOXAHATCHEE
NATIONAL
WILDLIFE
REFUGE
22
23
(Joins sheet 76)
(Joins sheet 78)
Tc
Oc
CONSERVATION
AREA
NO. 1
UD
Oc
CANAL
L-7
Tc
Tc
27
LIMIT OF SOIL SURVEY
Oc
Tc
830 000 FEET
(Joins sheet 89)
695 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000

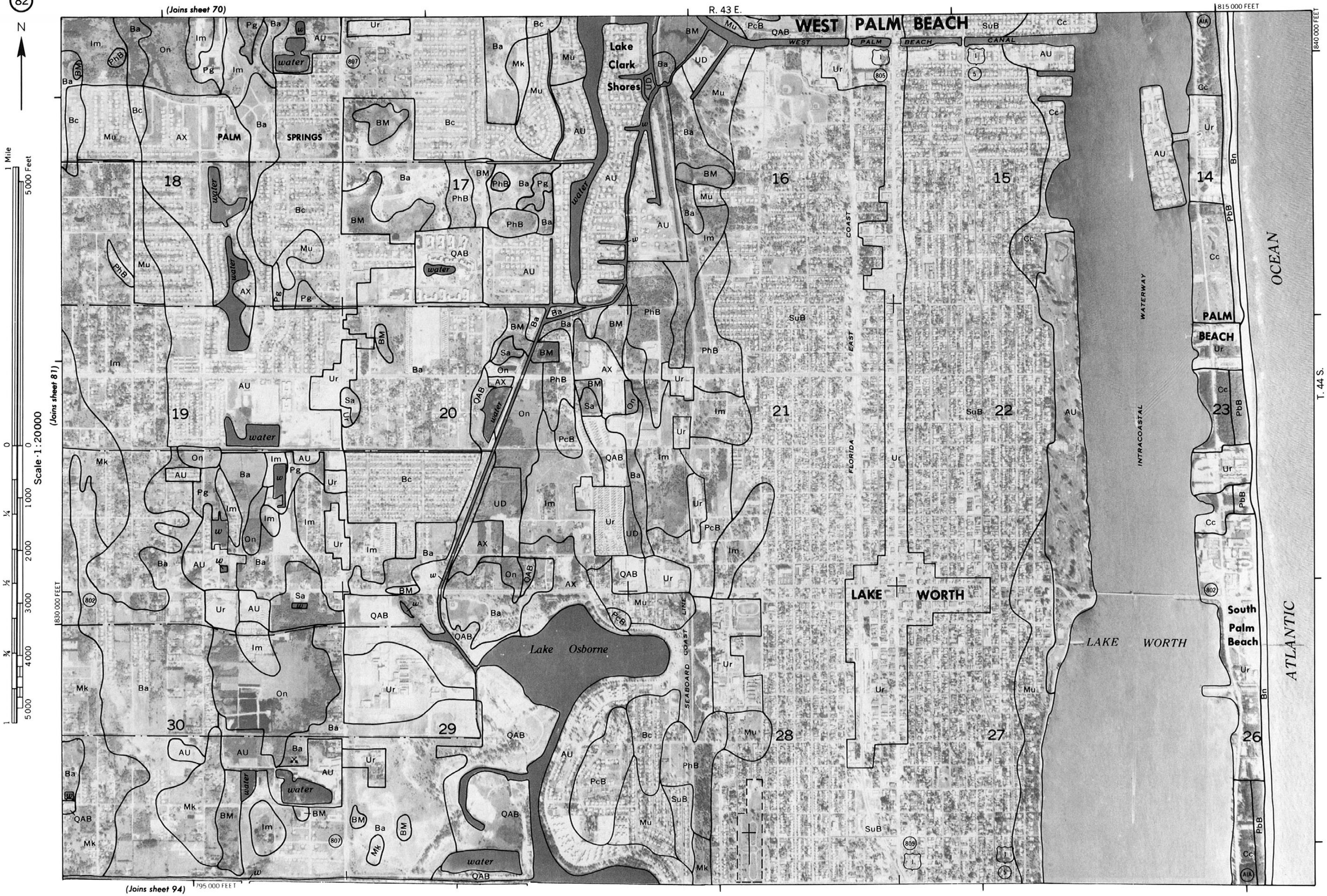

N
1 Mile
5000 Feet
0
0
Scale 1:20000
1000
¼
2000
½
3000
¾
4000
1
5000
(Joins sheet 66)
R. 40 E.
720 000 FEET
840 000 FEET
Ra
Ta
On
Oc
UD
LIMIT OF SOIL SURVEY
L-40 CANAL
LOXAHATCHEE
NATIONAL
WILDLIFE
REFUGE
CONSERVATION
AREA
NO. 1
(Joins sheet 77)
830 000 FEET
T. 44 S.
(Joins sheet 79)
(Joins sheet 91)
700 000 FEET
(Joins sheet 90)


R. 40 E.
R. 41 E.
(Joins sheet 67)
725 000 FEET
840 000 FEET
T. 44 S.
(Joins sheet 78)
(Joins sheet 80)
(Joins sheet 91)
745 000 FEET
830 000 FEET
15
22
27
LIMIT OF SOIL SURVEY
UD
L 40 CANAL
LOXAHATCHEE NATIONAL WILDLIFE
REFUGE
CONSERVATION AREA NO. 1
N
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 80



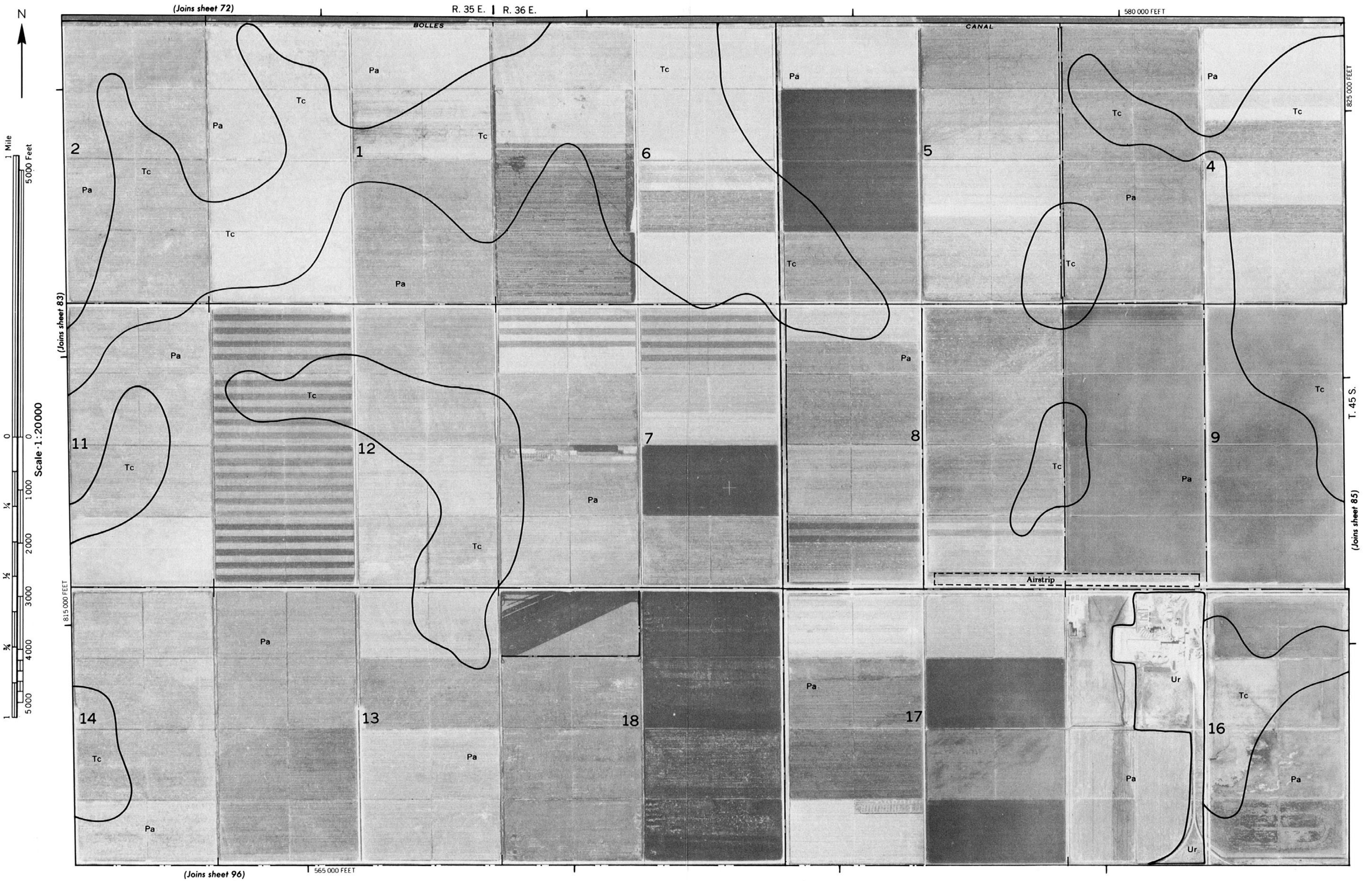

(Joins sheet 69)
R. 42 E.
775 000 FEET
840 000 FEET
T. 44 S.
(Joins sheet 80)
(Joins sheet 82)
(Joins sheet 93)
830 000 FEET
790 000 FEET
Greenacres City
N
Scale 1:20000
1 Mile
5000 Feet
16
15
14
13
21
22
23
24
28
27
26
25
802
809


N
(Joins sheet 70)
R. 43 E.
815 000 FEET
840 000 FEET
WEST PALM BEACH
WEST PALM BEACH CANAL
Lake Clark Shores
PALM SPRINGS
PALM BEACH
LAKE WORTH
Lake Osborne
LAKE WORTH
South Palm Beach
ATLANTIC OCEAN
INTRACOASTAL WATERWAY
FLORIDA EAST COAST
SEABOARD COAST LINE
T. 44 S.
(Joins sheet 81)
(Joins sheet 94)
795 000 FEET
830 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1/4
1/2
3/4
1
1000
2000
3000
4000
5000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 83

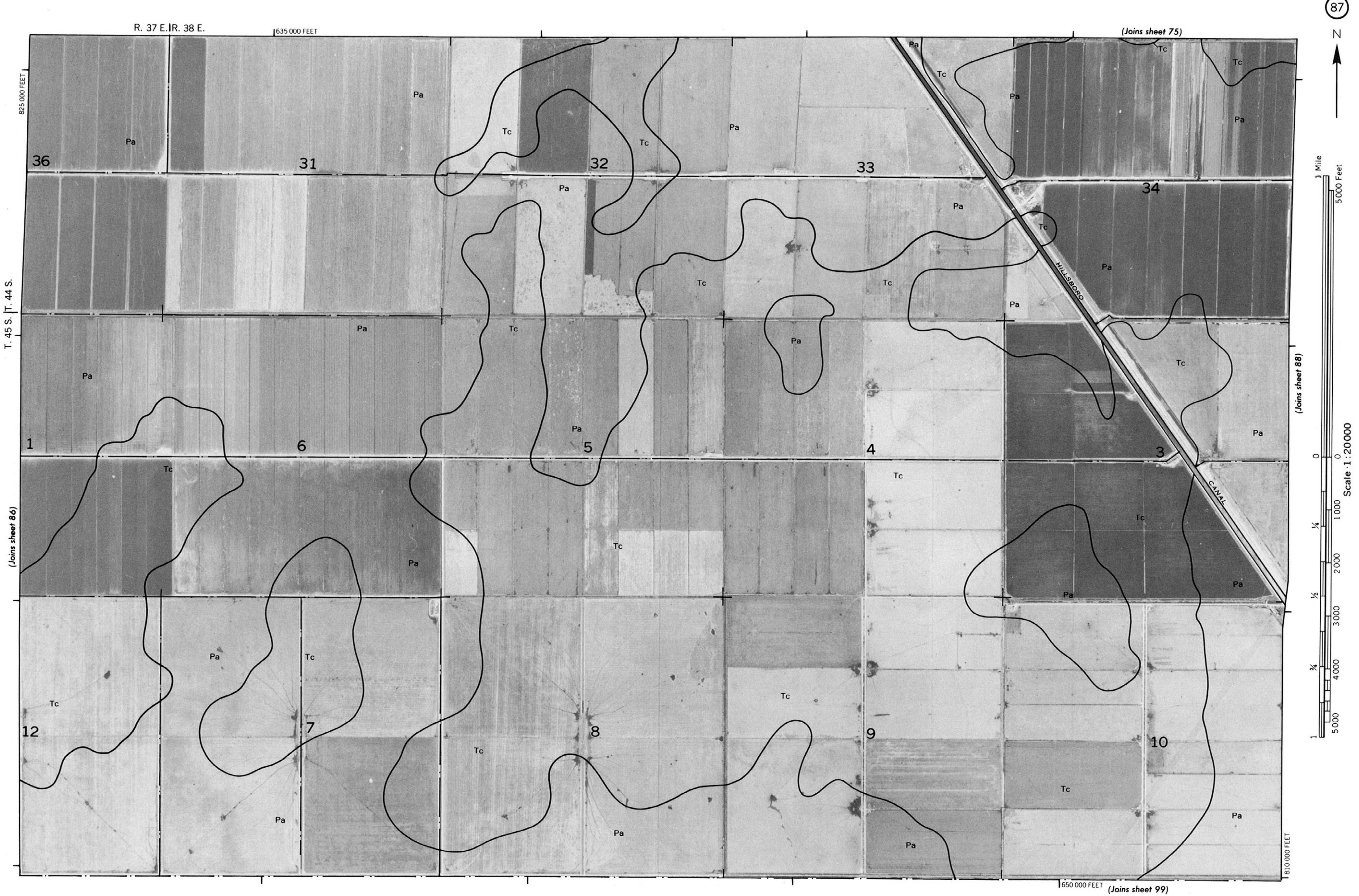
84

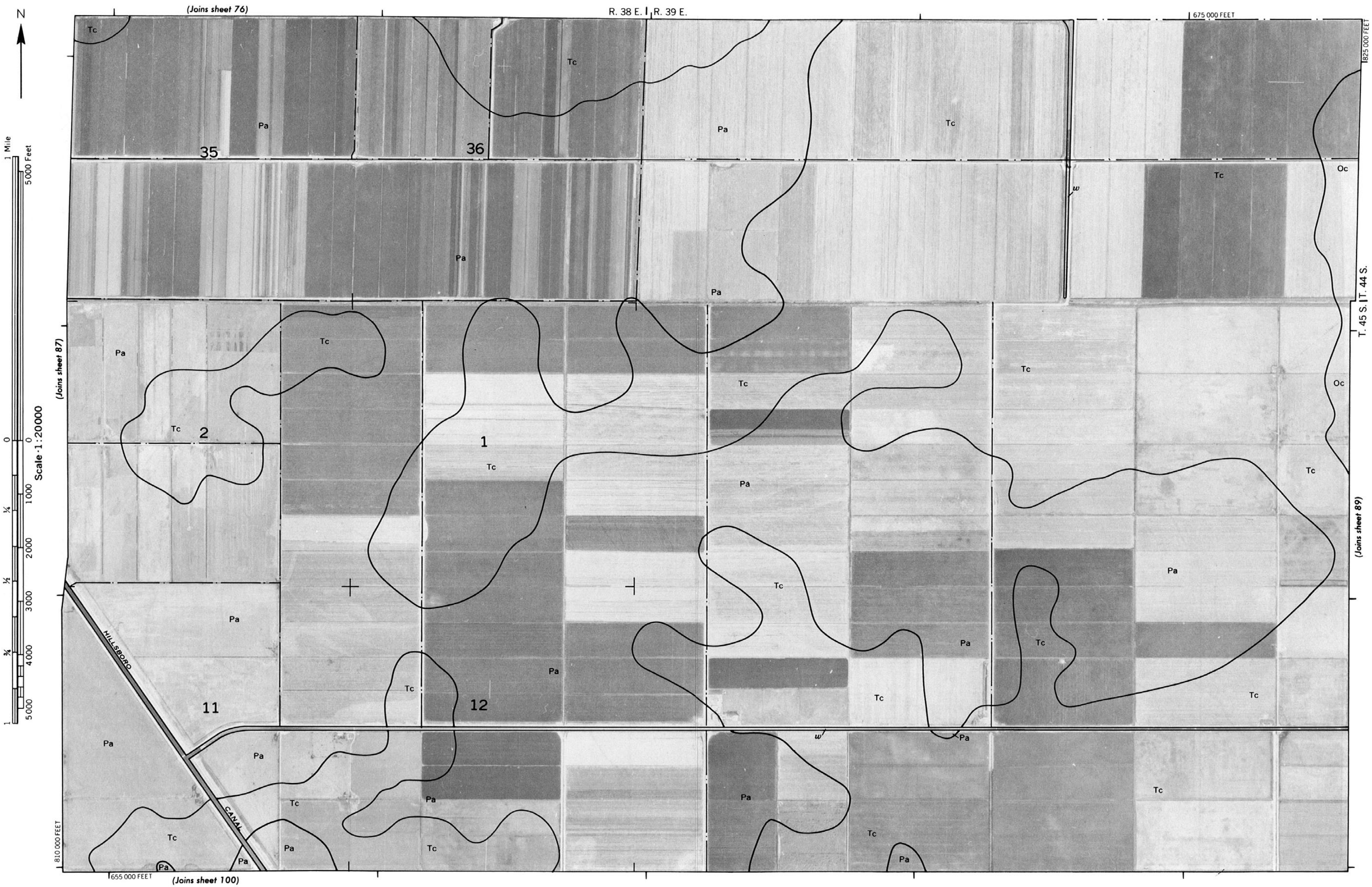
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 84



PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 85


N
(Joins sheet 74)
R. 37 E.
630 000 FEET
825 000 FEET
T. 44 S.
T. 45 S.
(Joins sheet 87)
(Joins sheet 85)
(Joins sheet 97)
810 000 FEET
(Joins sheet 98)
610 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000
34
35
36
1
12
Pa
Tc
Ur
w
SEWAGE
DISPOSAL
Airstrip
LINE
SEABOARD
COAST

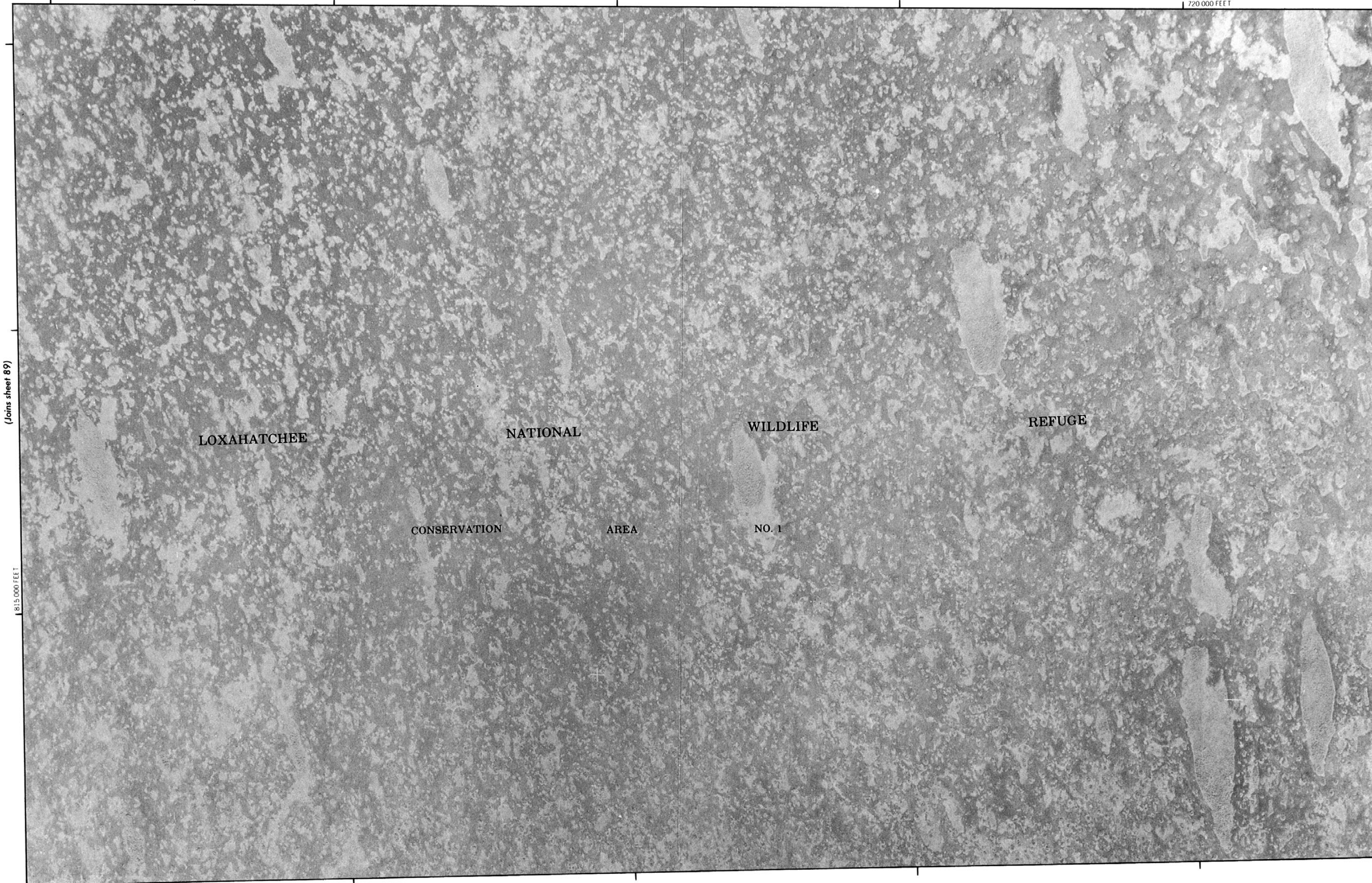

87
R. 37 E. | R. 38 E.
635 000 FEET
825 000 FEET
T. 45 S. | T. 44 S.
(Joins sheet 75)
(Joins sheet 86)
(Joins sheet 88)
(Joins sheet 99)
650 000 FEET
810 000 FEET
N
HILLSBORO
CANAL
1 Mile
5000 Feet
0
1/4
1/2
3/4
1
1000
2000
3000
4000
5000
Scale 1:20000
36
31
32
33
34
1
6
5
4
3
12
7
8
9
10
Pa
Tc


N
Scale 1:20000
1 Mile
5000 Feet
(Joins sheet 76)
(Joins sheet 87)
(Joins sheet 89)
(Joins sheet 100)
R. 38 E. | R. 39 E.
T. 44 S. | T. 45 S.
675 000 FEET
825 000 FEET
655 000 FEET
810 000 FEET
35
36
2
1
11
12
HILLSBORO
CANAL
Tc
Pa
Oc
w

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 89

N

(Joins sheet 78)



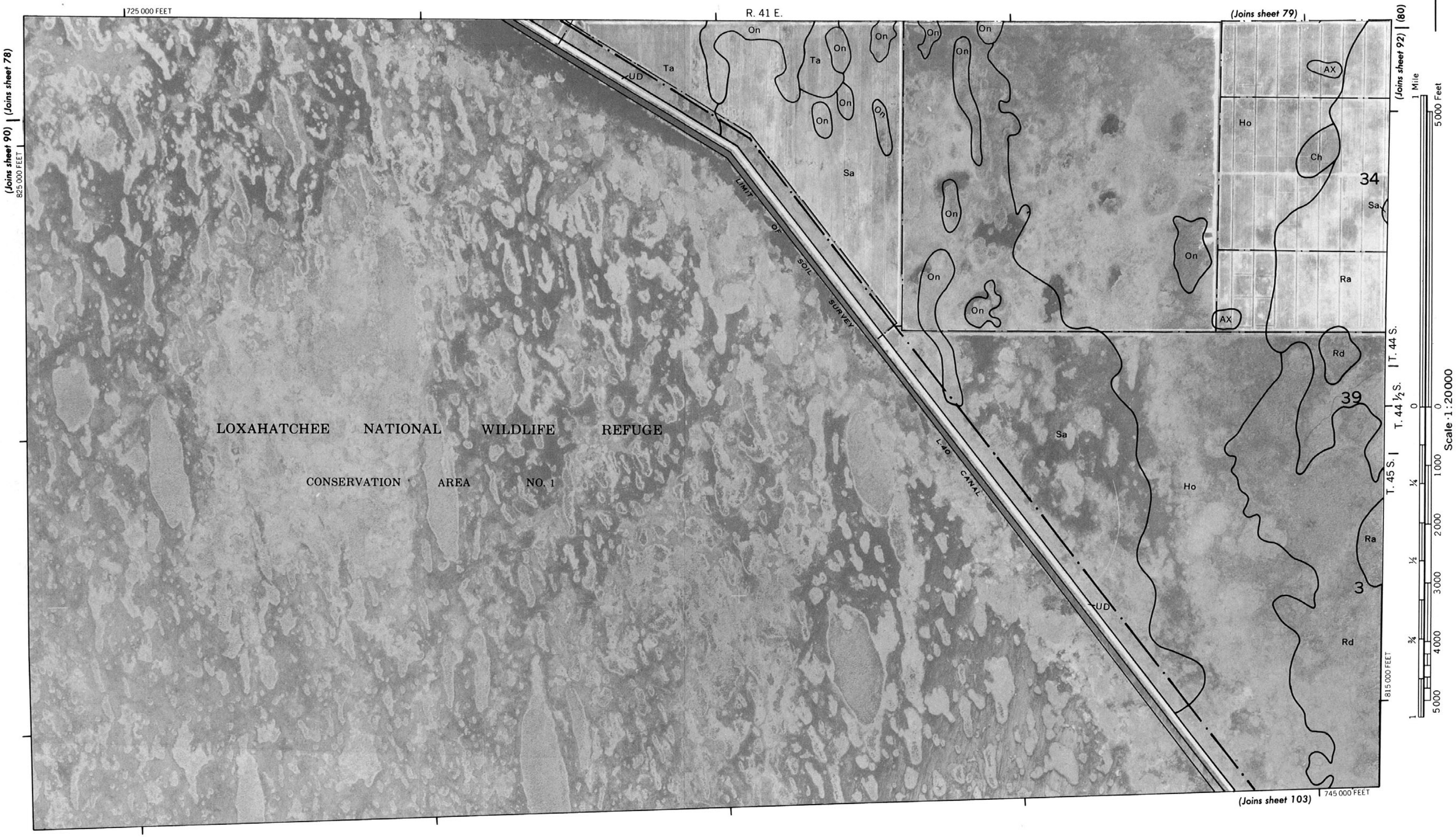
(Joins sheet 89)

(Joins sheet 103) | (Joins sheet 91)

(Joins sheet 102)

Scale 1:20000

1 Mile 5000 Feet 0 0 1000 ¼ 2000 ½ 3000 ¾ 4000 1 5000


N
725 000 FEET
R. 41 E.
(Joins sheet 79)
(80)
(Joins sheet 92)
(Joins sheet 78)
(Joins sheet 90)
825 000 FEET
(Joins sheet 103)
745 000 FEET
815 000 FEET
T. 44 S.
T. 44 1/2 S.
T. 45 S.
LOXAHATCHEE NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
LIMIT OF SOIL SURVEY
L-40 CANAL
UD
Ta
On
Sa
AX
Ho
Ch
Ra
Rd
34
39
3
1 Mile
5000 Feet
Scale 1:20000


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
0
¼
½
¾
1
(Joins sheet 80)
(Joins sheet 91)
(Joins sheet 93)
(Joins sheet 104)
R. 41 E.
R. 42 E.
770 000
825 000 FEET
815 000 FEET
750 000 FEET
T. 44 S.
T. 44½ S.
T. 45 S.
SANITARY LANDFILL
SUNSHINE STATE PARKWAY
441
7
34
35
36
31
32
39
38
37
42
41
3
2
1
6
5

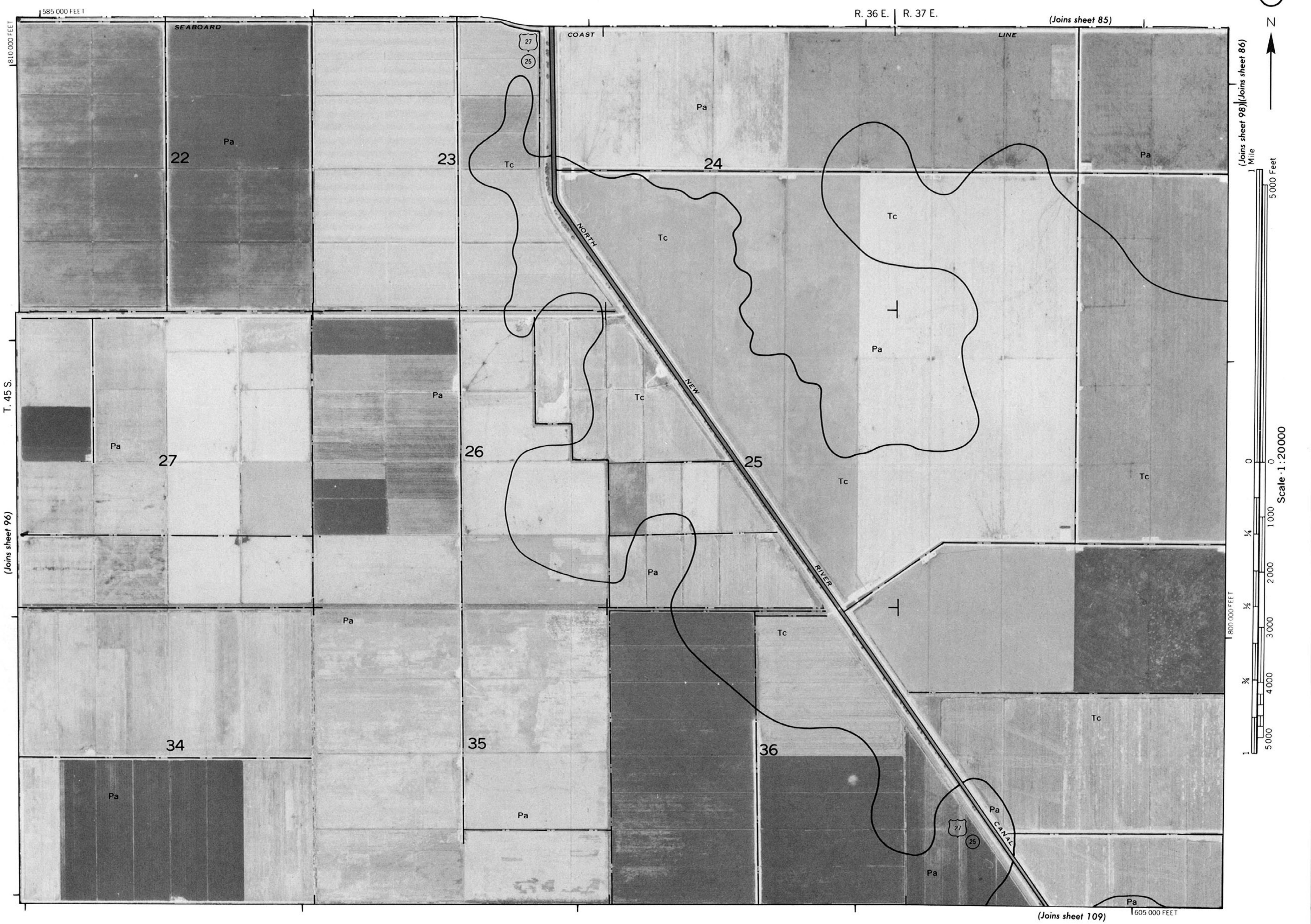

93
N
775 000 FEET
R. 42 E.
(Joins sheet 81)
825 000 FEET
(Joins sheet 92)
T. 44 S.
T. 44½ S.
T. 45 S.
Atlantis
(Joins sheet 94)
815 000 FEET
(Joins sheet 105)
790 000 FEET
1 Mile
5000 Feet
Scale 1:20000


N
(Joins sheet 82)
(Joins sheet 93)
(Joins sheet 106)
Scale 1:20000
1 Mile
5 000 Feet
R. 43 E.
T. 44 S.
T. 45 S.
815 000 FEET
820 000 FEET
795 000 FEET
PALM BEACH GARDENS
AIR PARK
Atlantis
Lake
Osborne
LAKE IDA CANAL
SEABOARD COAST LINE
FLORIDA EAST COAST
LANTANA
LAKE
WORTH
INTRACOASTAL
WATERWAY
Hypoluxo
Island
South
Palm
Beach
ATLANTIC
OCEAN
31
32
33
34
35
38
39
6
5
4
3
2

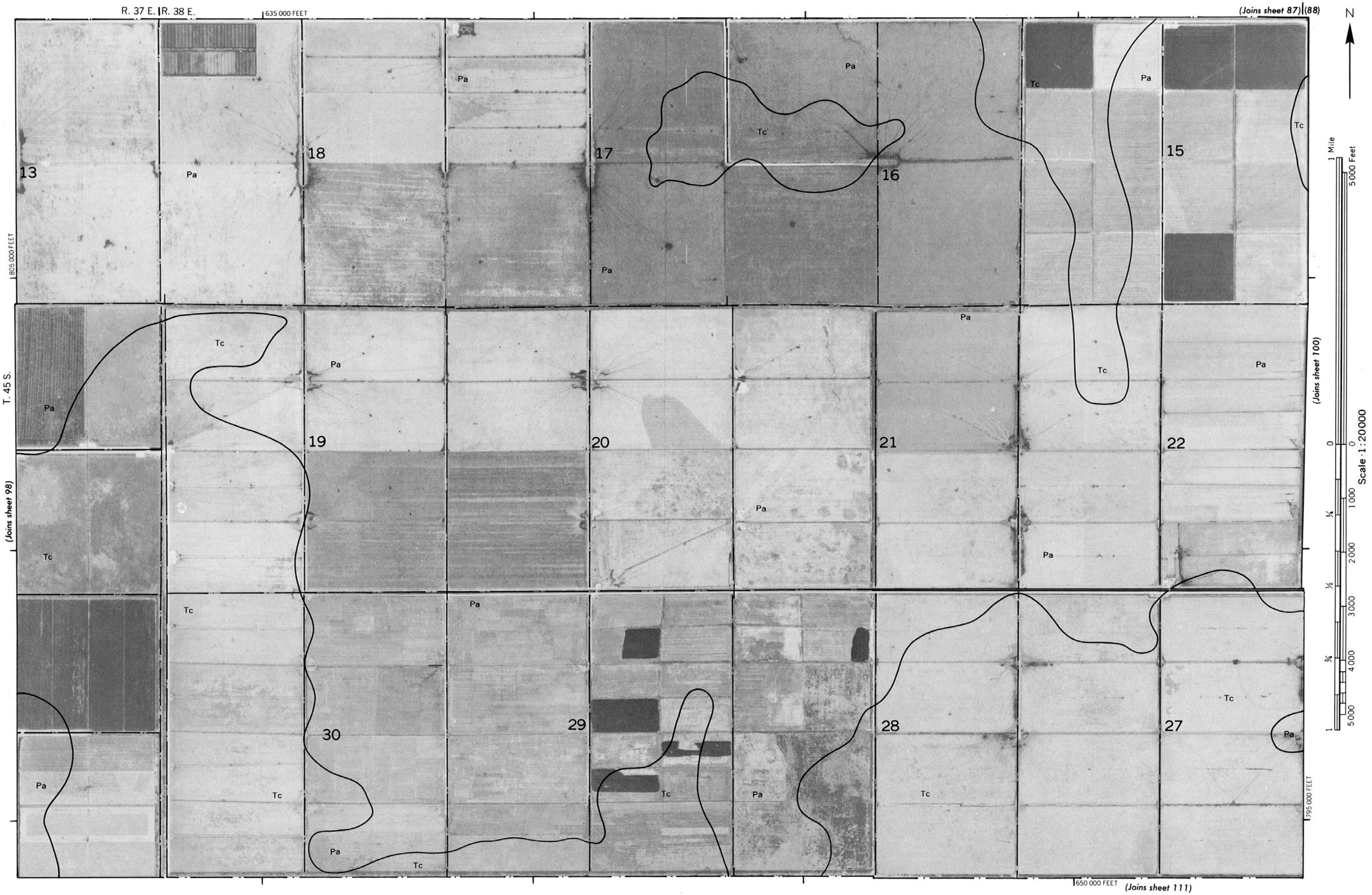
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 95

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 96

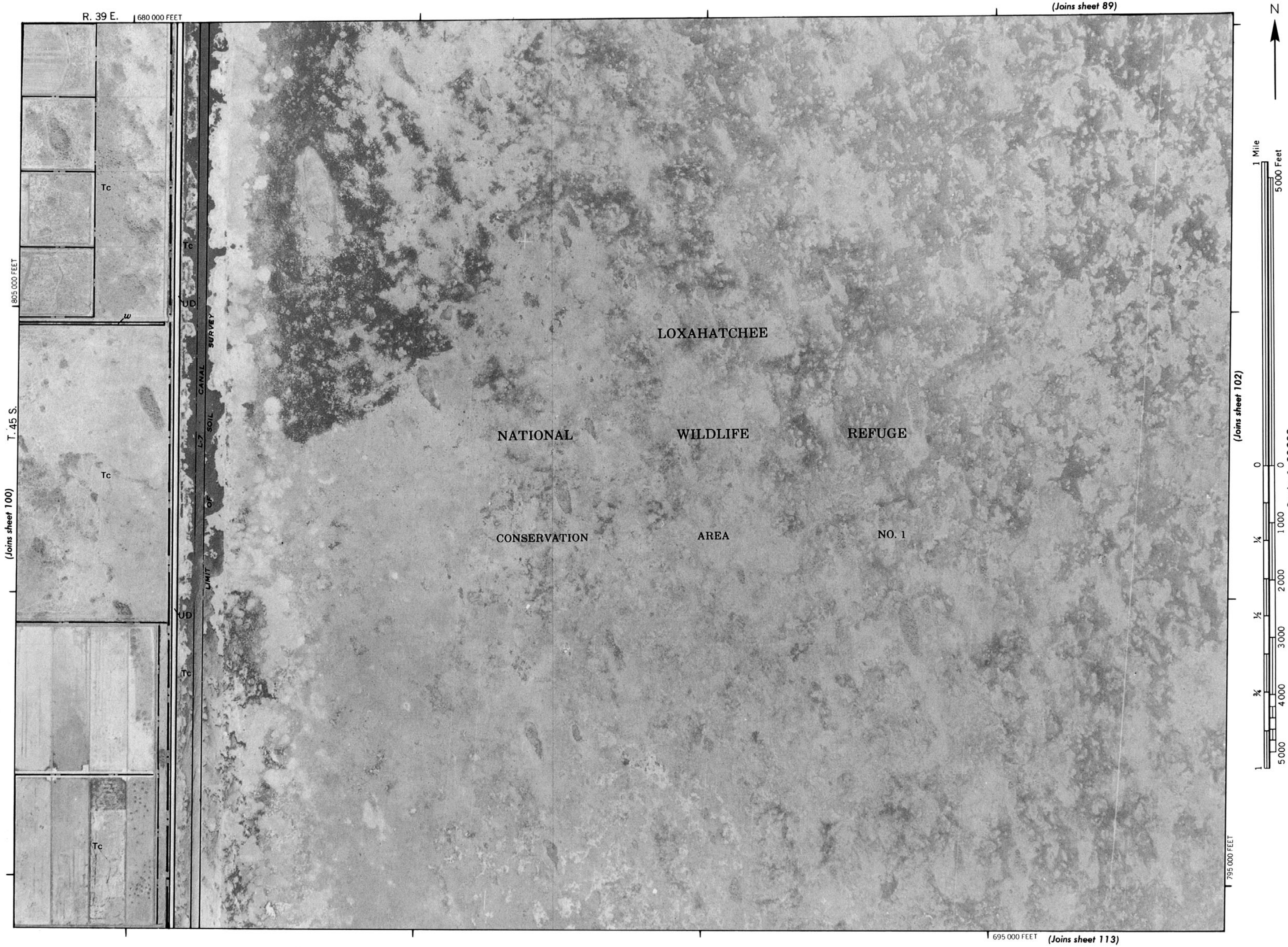
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 97



PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 98


99
N
R. 37 E.
R. 38 E.
635 000 FEET
(Joins sheet 87)
(88)
805 000 FEET
T. 45 S.
(Joins sheet 98)
(Joins sheet 100)
795 000 FEET
650 000 FEET
(Joins sheet 111)
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000
13
18
17
16
15
19
20
21
22
30
29
28
27
Pa
Tc


N
(Joins sheet 88)
R. 38 E.
R. 39 E.
675 000 FEET
805 000 FEET
T. 45 S.
(Joins sheet 101)
(Joins sheet 99)
(Joins sheet 112)
655 000 FEET
795 000 FEET
1 Mile
5 000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000
HILLSBORO
CANAL
13
14
23
24
25
26
Pa
Tc
w


N
R. 39 E.
680 000 FEET
(Joins sheet 89)
805 000 FEET
T. 45 S.
(Joins sheet 100)
(Joins sheet 102)
(Joins sheet 113)
695 000 FEET
795 000 FEET
Tc
UD
L-7 CANAL
LIMIT OF SOIL SURVEY
LOXAHATCHEE
NATIONAL
WILDLIFE
REFUGE
CONSERVATION
AREA
NO. 1
1 Mile
5 000 Feet
0
¼
½
¾
1
1000
2000
3000
4000
5000
Scale 1:20000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 102

725 000 FEET

(Joins sheet 91)

(Joins sheet 90)

(Joins sheet 102)

810 000 FEET

N

(Joins sheet 104)

800 000 FEET

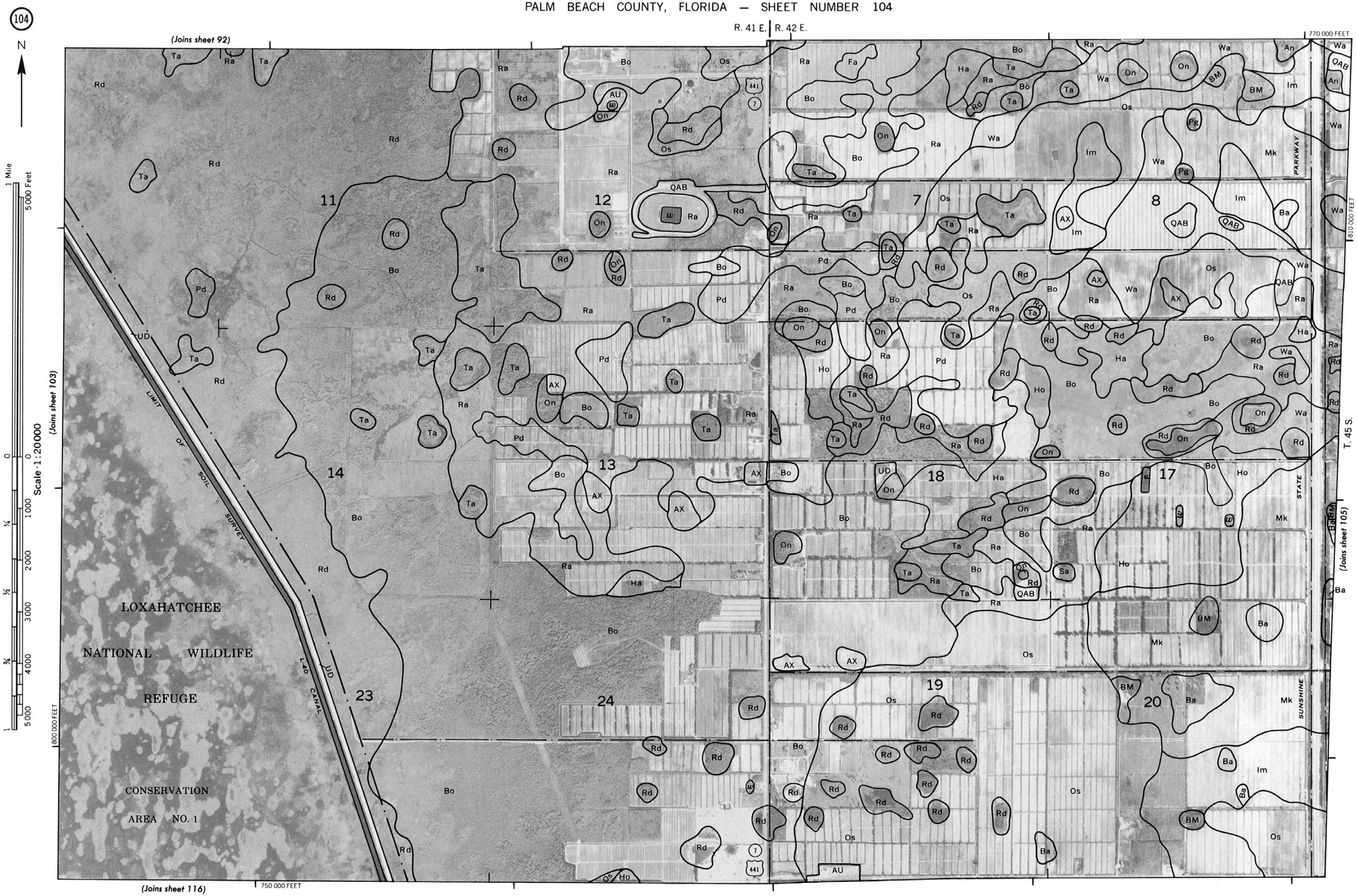
1 Mile ¾ ½ ¼ 0

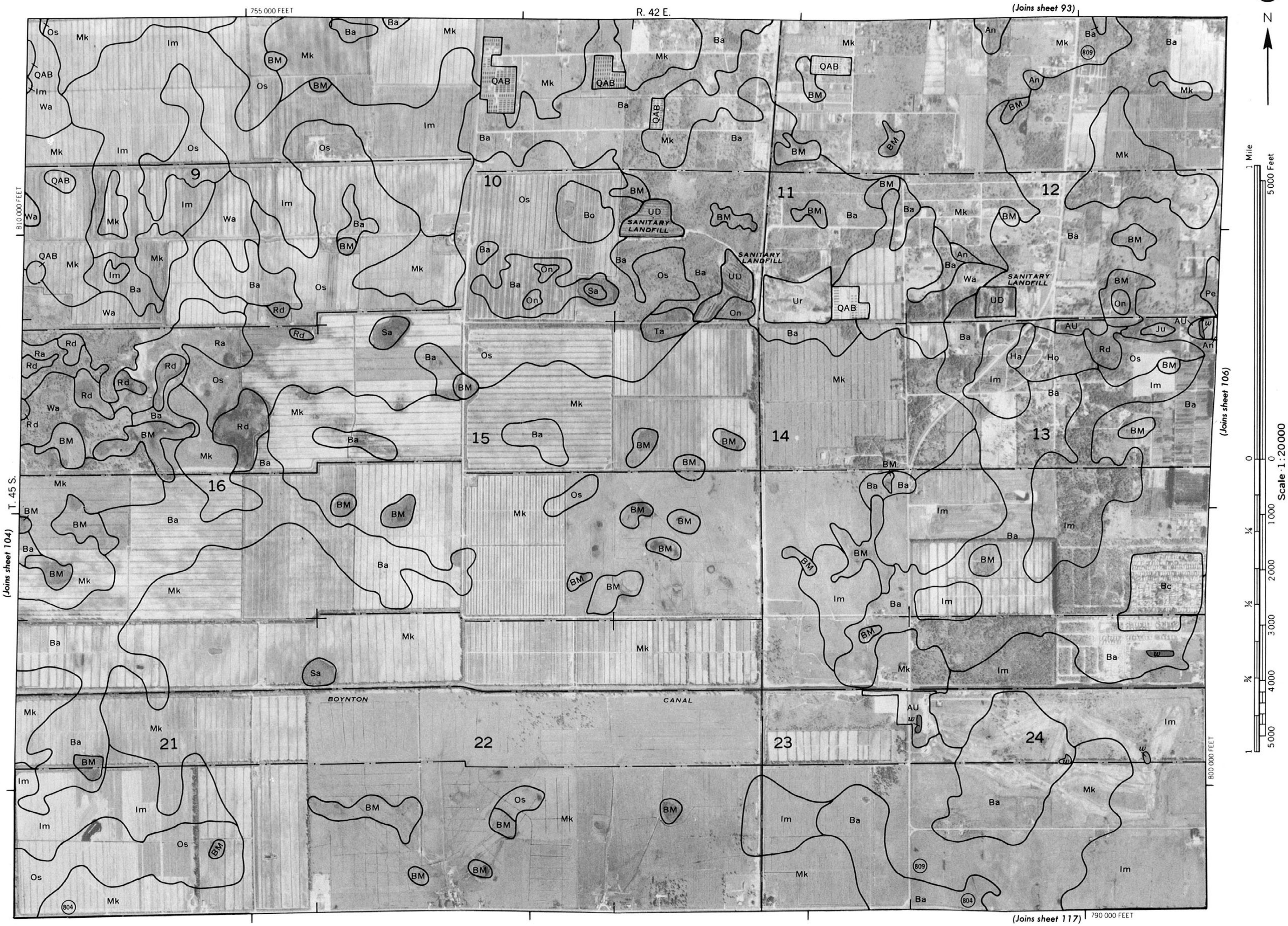
5000 Feet 0 1000 2000 3000 4000 5000

Scale 1:20000

(Joins sheet 115)

745 000 FEET

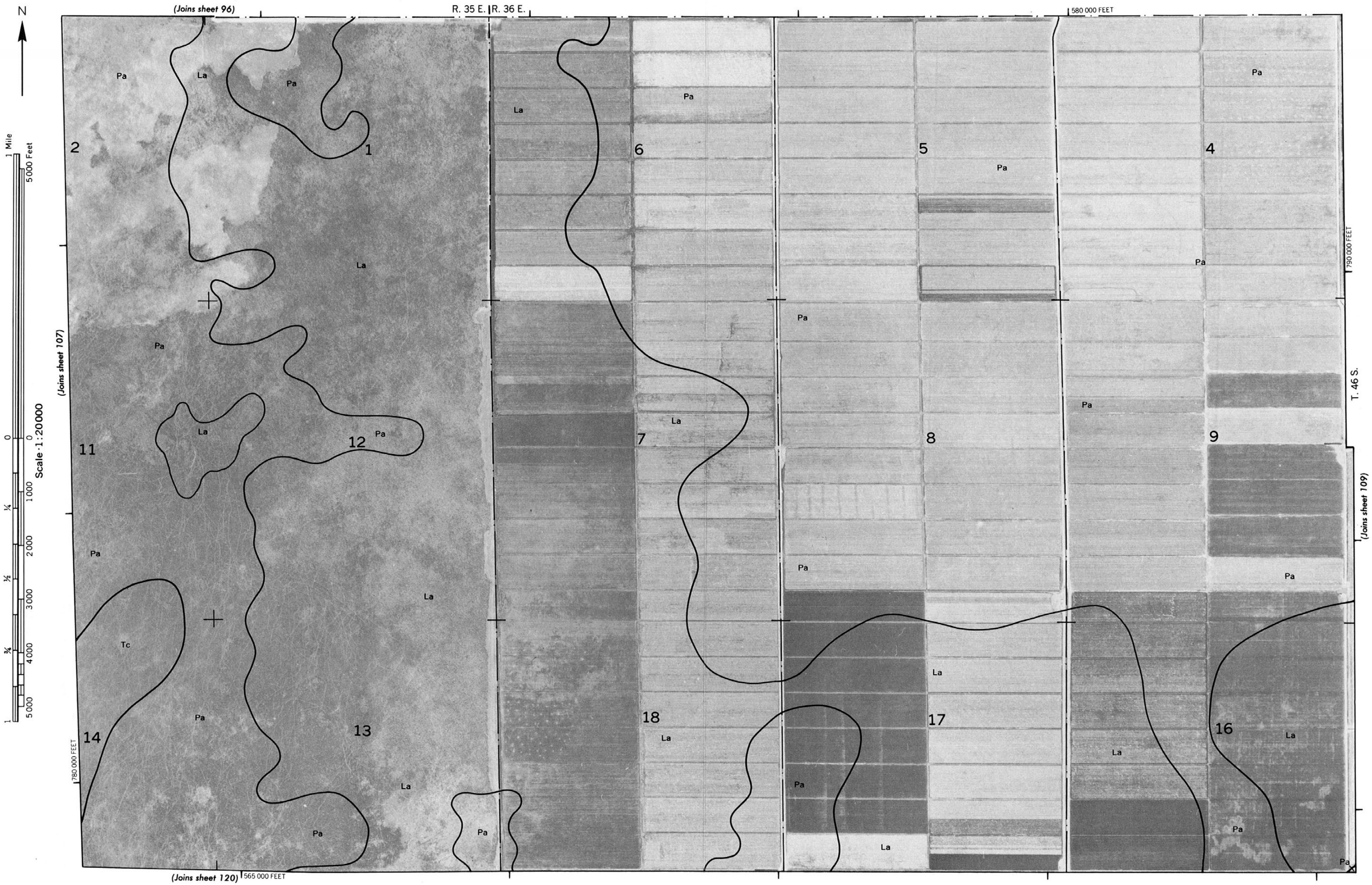

104
N
(Joins sheet 92)
(Joins sheet 103)
(Joins sheet 105)
(Joins sheet 116)
R. 41 E. R. 42 E.
T. 45 S.
770 000 FEET
810 000 FEET
800 000 FEET
750 000 FEET
Scale 1:20000
1 Mile
5 000 Feet
LOXAHATCHEE NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
LIMIT OF SOIL SURVEY
L-40 CANAL
STATE PARKWAY
SUNSHINE STATE PARKWAY


755 000 FEET
R. 42 E.
(Joins sheet 93)
N
810 000 FEET
T. 45 S.
(Joins sheet 104)
(Joins sheet 106)
800 000 FEET
(Joins sheet 117)
790 000 FEET
SANITARY LANDFILL
SANITARY LANDFILL
SANITARY LANDFILL
BOYNTON
CANAL
9
10
11
12
13
14
15
16
21
22
23
24
1 Mile
5000 Feet
Scale 1:20000


N
(Joins sheet 94)
R. 43 E.
815 000 FEET
810 000 FEET
800 000 FEET
795 000 FEET
(Joins sheet 105)
(Joins sheet 118)
T. 45 S.
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
LAKE WORTH
ATLANTIC
OCEAN
INTRACOASTAL
WATERWAY
Hypoluxo
Hypoluxo
Island
Manalapan
Ocean
Ridge
BOYNTON
BEACH
LAKE
IDA
CANAL
SEABOARD
COAST
LINE
FLORIDA
EAST
COAST
A1A
1
5
7
8
9
10
15
16
17
18
19
20
21
22
Ba
BM
Im
Sa
PhB
On
Tc
An
Pe
Po
AX
ScB
Mk
PcB
QAB
SuB
AU
TM
Mu
Cc
CuB
Bn
Ur
ASF
Wn
TO
UD
w

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 107

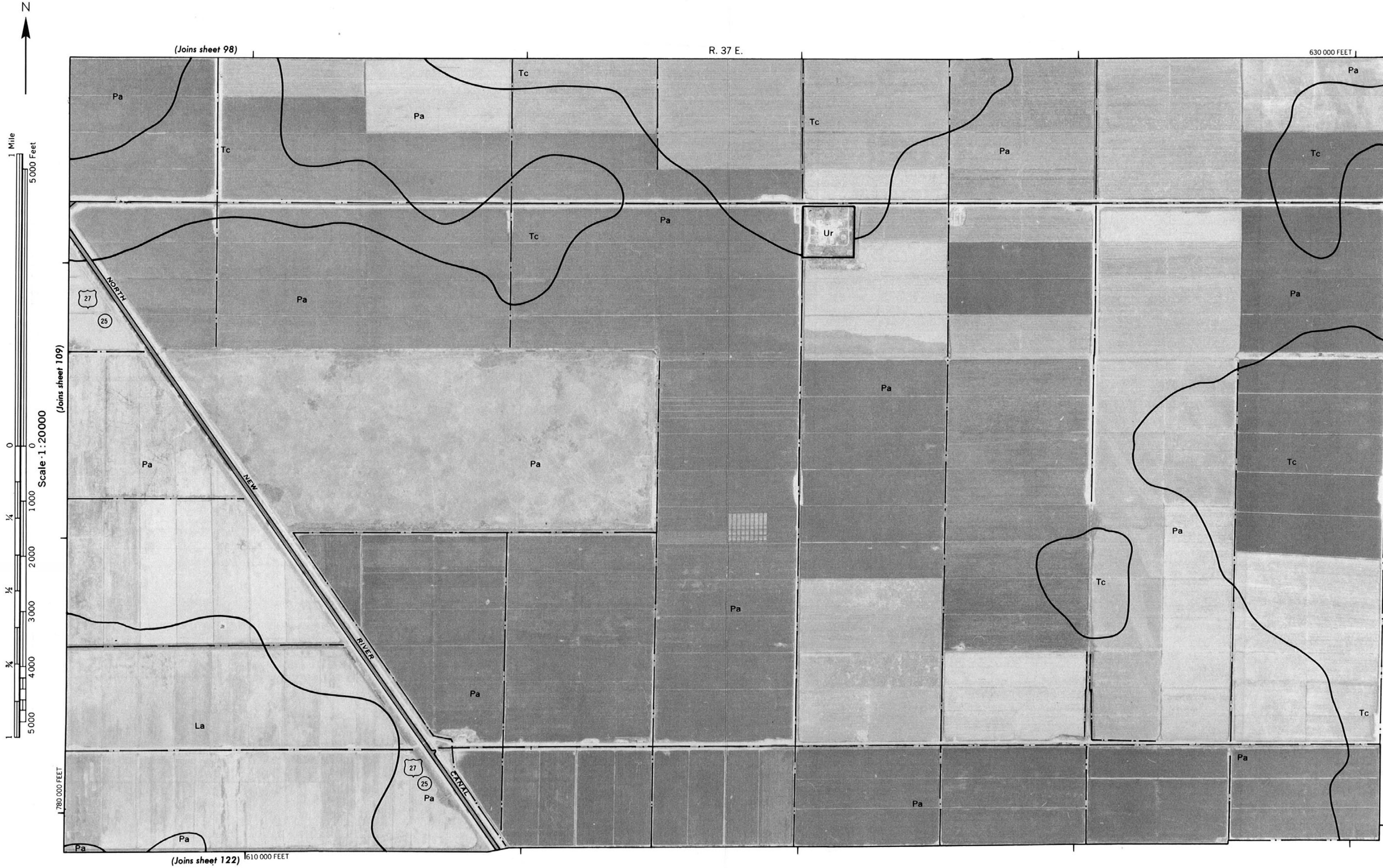
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 108

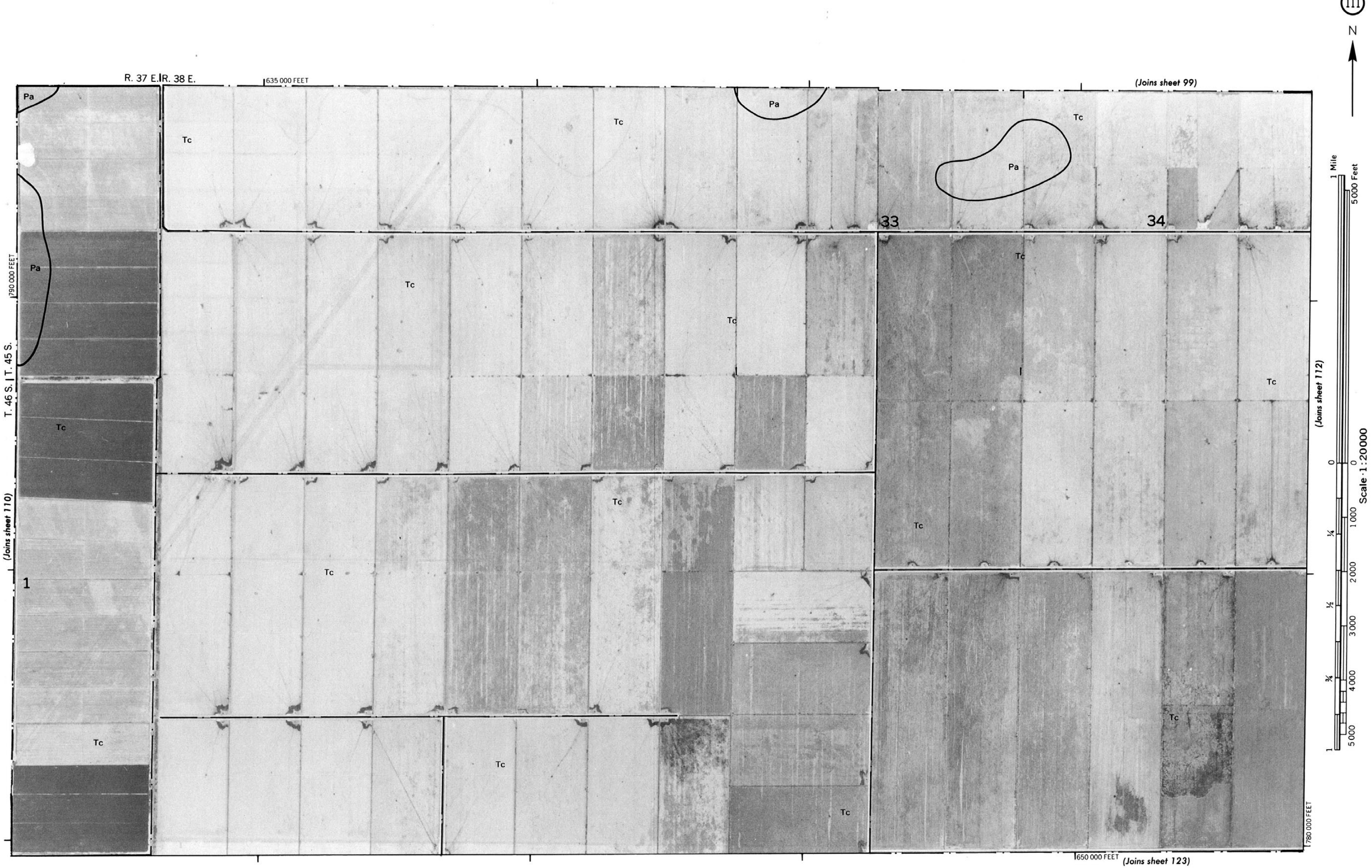


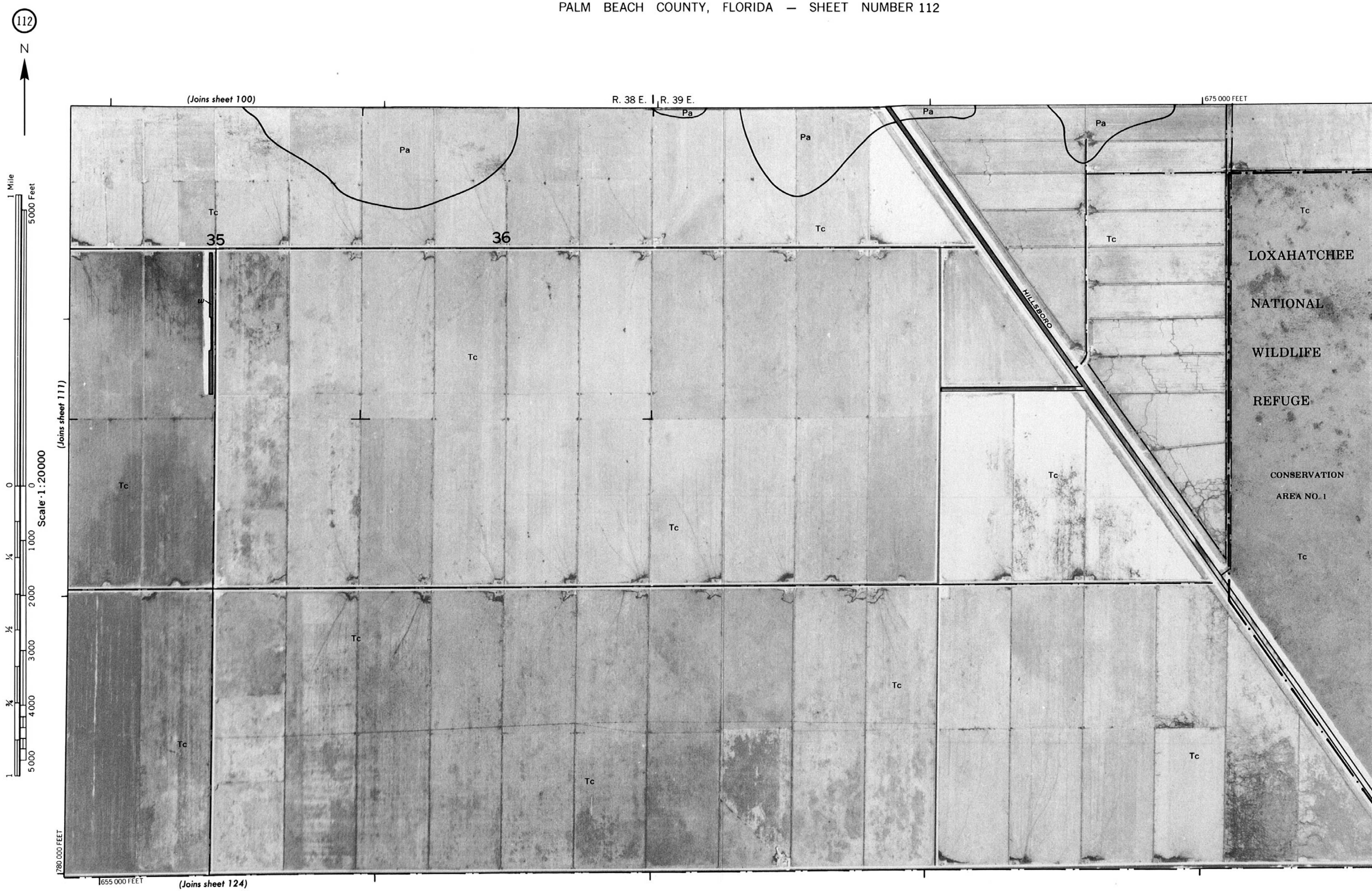
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 109

109

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 110




111
N
R. 37 E. | R. 38 E.
635 000 FEET
(Joins sheet 99)
T. 46 S. | T. 45 S.
790 000 FEET
(Joins sheet 110)
(Joins sheet 112)
(Joins sheet 123)
650 000 FEET
780 000 FEET
Pa
Tc
33
34
1
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1000
2000
3000
4000
5000


112
N
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000
(Joins sheet 100)
R. 38 E. | R. 39 E.
675 000 FEET
(Joins sheet 111)
(Joins sheet 113)
(Joins sheet 124)
790 000 FEET
780 000 FEET
655 000 FEET
T. 46 S. | T. 45 S.
35
36
Pa
Tc
w
HILLSBORO
LOXAHATCHEE
NATIONAL
WILDLIFE
REFUGE
CONSERVATION
AREA NO. 1


113
N
680 000 FEET
R. 39 E.
(Joins sheet 101)
Tc
UD
Tc
Tc
790 000 FEET
T. 46 S. T. 45 S.
L-7 CANAL
LIMIT OF SOIL SURVEY
LOXAHATCHEE
NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
(Joins sheet 112)
Tc
UD
Tc
HILLSBORO CANAL
Tc
(Joins sheet 114)
785 000 FEET
695 000 FEET
(Joins sheet 125)
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000

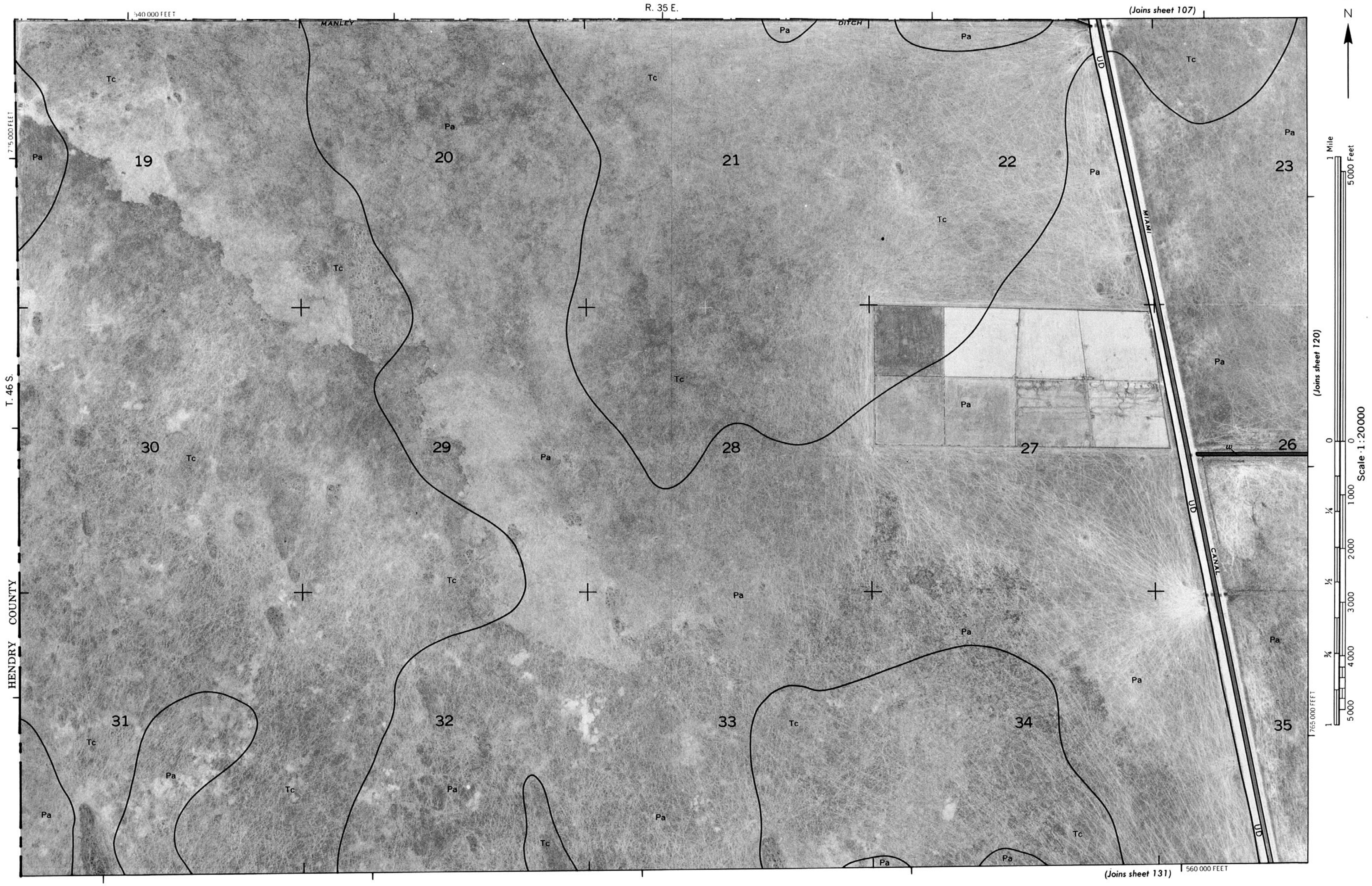

114
N
(Joins sheet 102)
720 000 FEET
790 000 FEET
(Joins sheet 113)
(Joins sheet 115)
785 000 FEET
700 000 FEET
(Joins sheet 126)
LOXAHATCHEE
NATIONAL
WILDLIFE
REFUGE
CONSERVATION
AREA
NO. 1
Scale 1:20000
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000

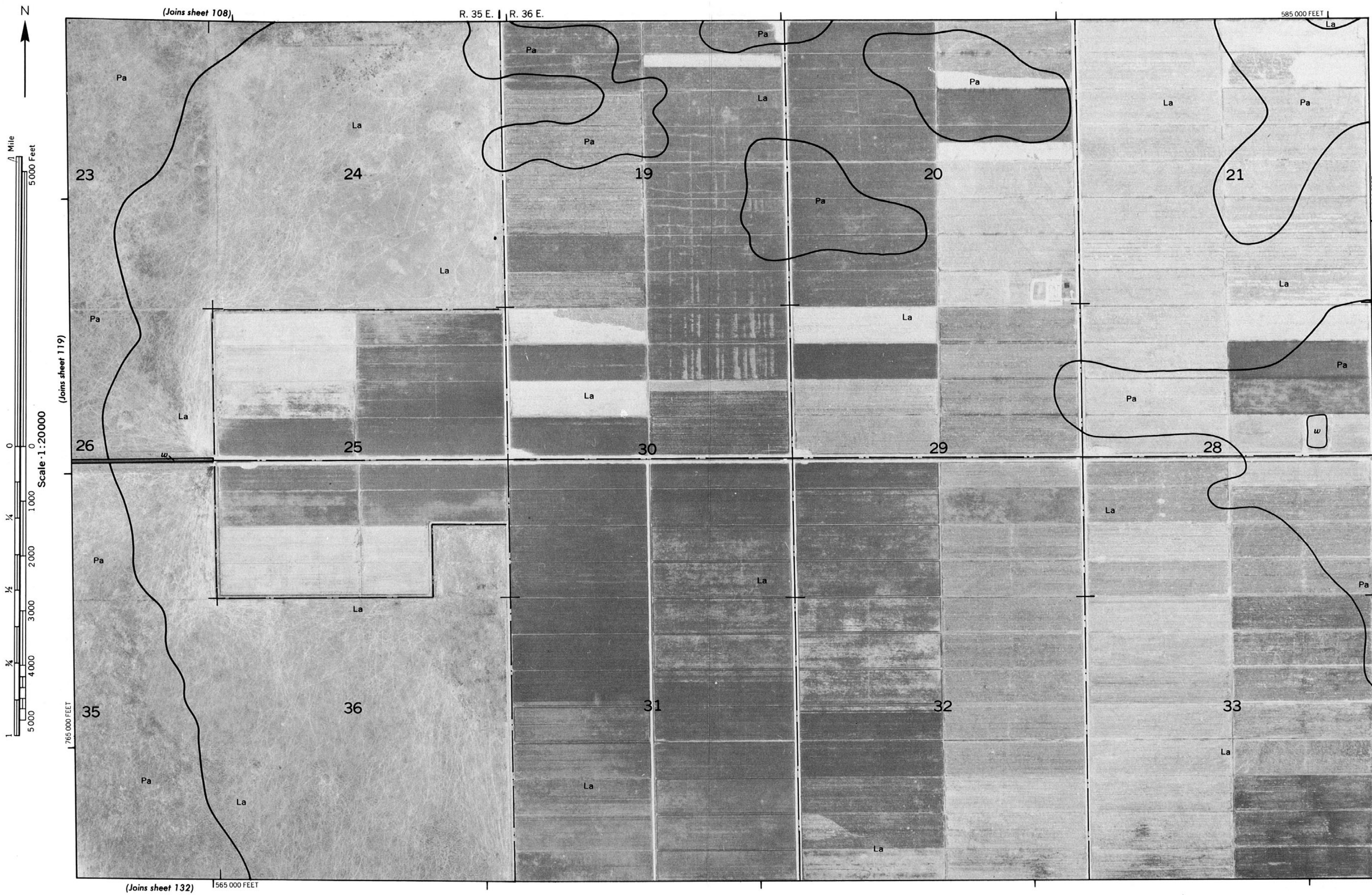
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 115

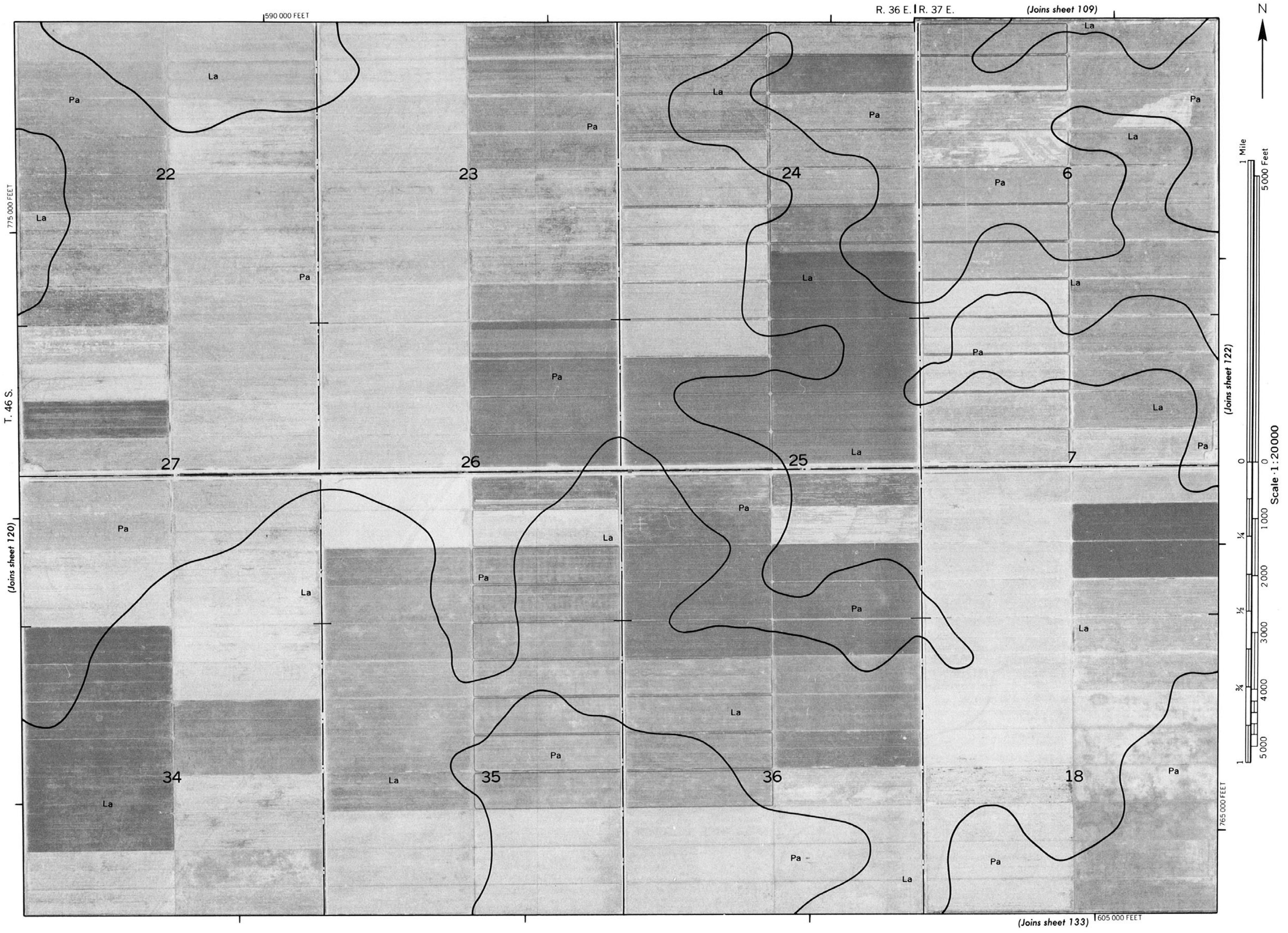

116
N
(Joins sheet 104)
(Joins sheet 115)
(Joins sheet 117)
(Joins sheet 128)
R. 41 E. | R. 42 E.
770 000 FEET
795 000 FEET
785 000 FEET
750 000 FEET
T. 45 S.
T. 46 S.
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
LOXAHATCHEE
NATIONAL
WILDLIFE
REFUGE
CONSERVATION
AREA NO. 1
LIMIT OF SOIL SURVEY
CANAL L-40
SUNSHINE STATE PARKWAY
7
441
25
36
1
30
31
6
29
32
5
Bo
Rd
Os
UD
On
Ho
Mk
Im
BM
Ur
w
AU
Sa
Ba
Pg
An


775 000 FEET
R. 42 E.
(Joins sheet 105)
N
795 000 FEET
(Joins sheet 116)
T. 46 S. | T. 45 S.
(Joins sheet 118)
(Joins sheet 129)
790 000 FEET
785 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000
804
809
28
27
26
25
33
34
35
36
4
3
2
1
Os
On
AX
Sa
BM
Mk
QAB
AU
Ba
Im
An
w
water
Mu
Golf
Pk
PnB


N
R. 43 E.
815 000 FEET
(Joins sheet 106)
(Joins sheet 117)
(Joins sheet 130)
795 000 FEET
785 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
T. 46 S. | T. 45 S.
BOYNTON BEACH
Ocean Ridge
Briney Breezes
Gulf Stream
ATLANTIC OCEAN
INTRACOASTAL WATERWAY
LAKE IDA CANAL
SEABOARD COAST LINE
FLORIDA EAST COAST
Lake Ida
Golf
water
29
30
28
27
31
32
33
34
6
5
4
3


R. 35 E.
540 000 FEET
MANLEY
DITCH
(Joins sheet 107)
N
775 000 FEET
T. 46 S.
HENDRY COUNTY
(Joins sheet 120)
(Joins sheet 131)
560 000 FEET
765 000 FEET
MIAMI
CANAL
UD
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
Tc
Pa
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

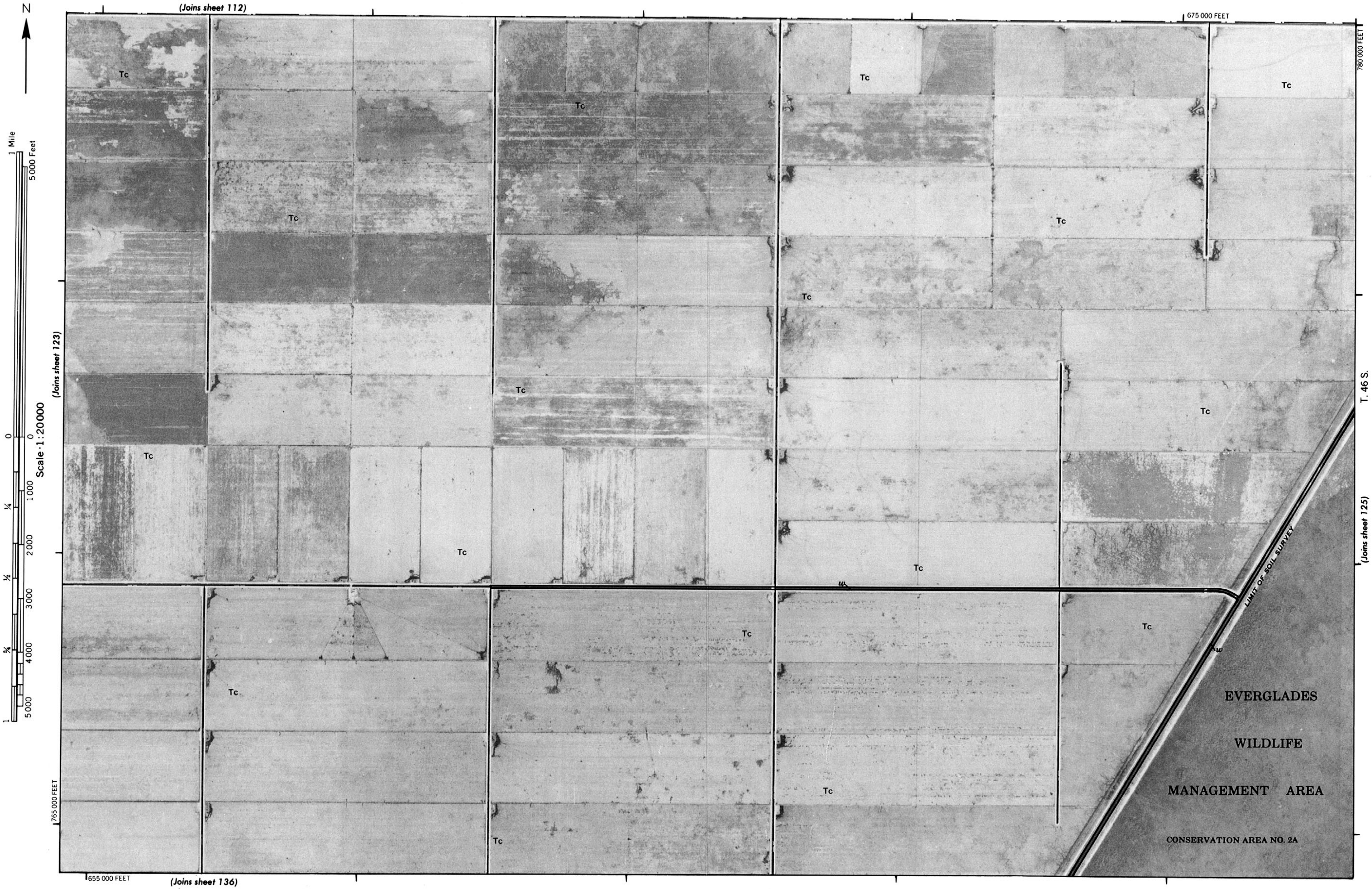

N
(Joins sheet 108)
R. 35 E.
R. 36 E.
585 000 FEET
775 000 FEET
T. 46 S.
(Joins sheet 119)
(Joins sheet 121)
(Joins sheet 132)
565 000 FEET
765 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33
Pa
La
W
w

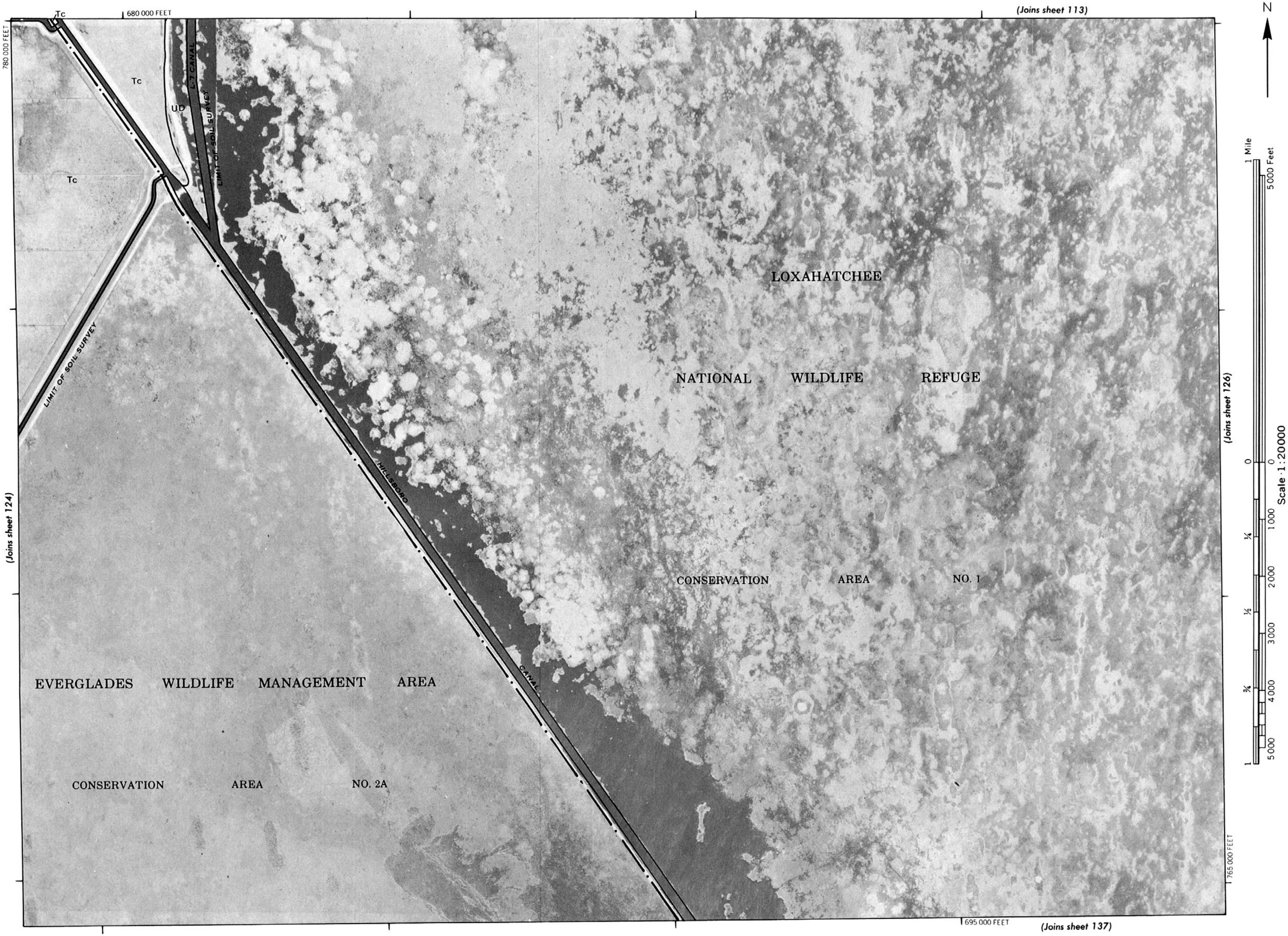

590 000 FEET
R. 36 E. | R. 37 E.
(Joins sheet 109)
N
775 000 FEET
T. 46 S.
(Joins sheet 120)
(Joins sheet 122)
(Joins sheet 133)
605 000 FEET
765 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
¼
½
¾
1
1000
2000
3000
4000
5000
22
23
24
6
27
26
25
7
34
35
36
18
Pa
La


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
(Joins sheet 110)
R. 37 E.
630 000 FEET
775 000 FEET
T. 46 S.
(Joins sheet 121)
(Joins sheet 123)
(Joins sheet 134)
610 000 FEET
765 000 FEET
NORTH NEW RIVER CANAL
27
25
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
Pa
La
Tc
Ur


R. 37 E. R. 38 E.
635 000 FEET
(Joins sheet 111)
N
775 000 FEET
T. 46 S.
(Joins sheet 122)
(Joins sheet 124)
(Joins sheet 135)
650 000 FEET
765 000 FEET
1
12
13
Tc
Pa
w
1 Mile
5000 Feet
0
¼
½
¾
1
1000
2000
3000
4000
5000
Scale 1:20000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 124




125
N
(Joins sheet 113)
680 000 FEET
780 000 FEET
Tc
Tc
UD
L-7 CANAL
LIMIT OF SOIL SURVEY
Tc
LIMIT OF SOIL SURVEY
LOXAHATCHEE
NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
HILLSBORO CANAL
(Joins sheet 124)
(Joins sheet 126)
EVERGLADES WILDLIFE MANAGEMENT AREA
CONSERVATION AREA NO. 2A
765 000 FEET
695 000 FEET
(Joins sheet 137)
1 Mile
5 000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000


N
1 Mile
5000 Feet
0
0
Scale 1:20000
1000
¼
2000
½
3000
¾
4000
5000
1
(Joins sheet 114)
720 000 FEET
780 000 FEET
(Joins sheet 125)
(Joins sheet 127)
LOXAHATCHEE NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
765 000 FEET
700 000 FEET
(Joins sheet 138)

N

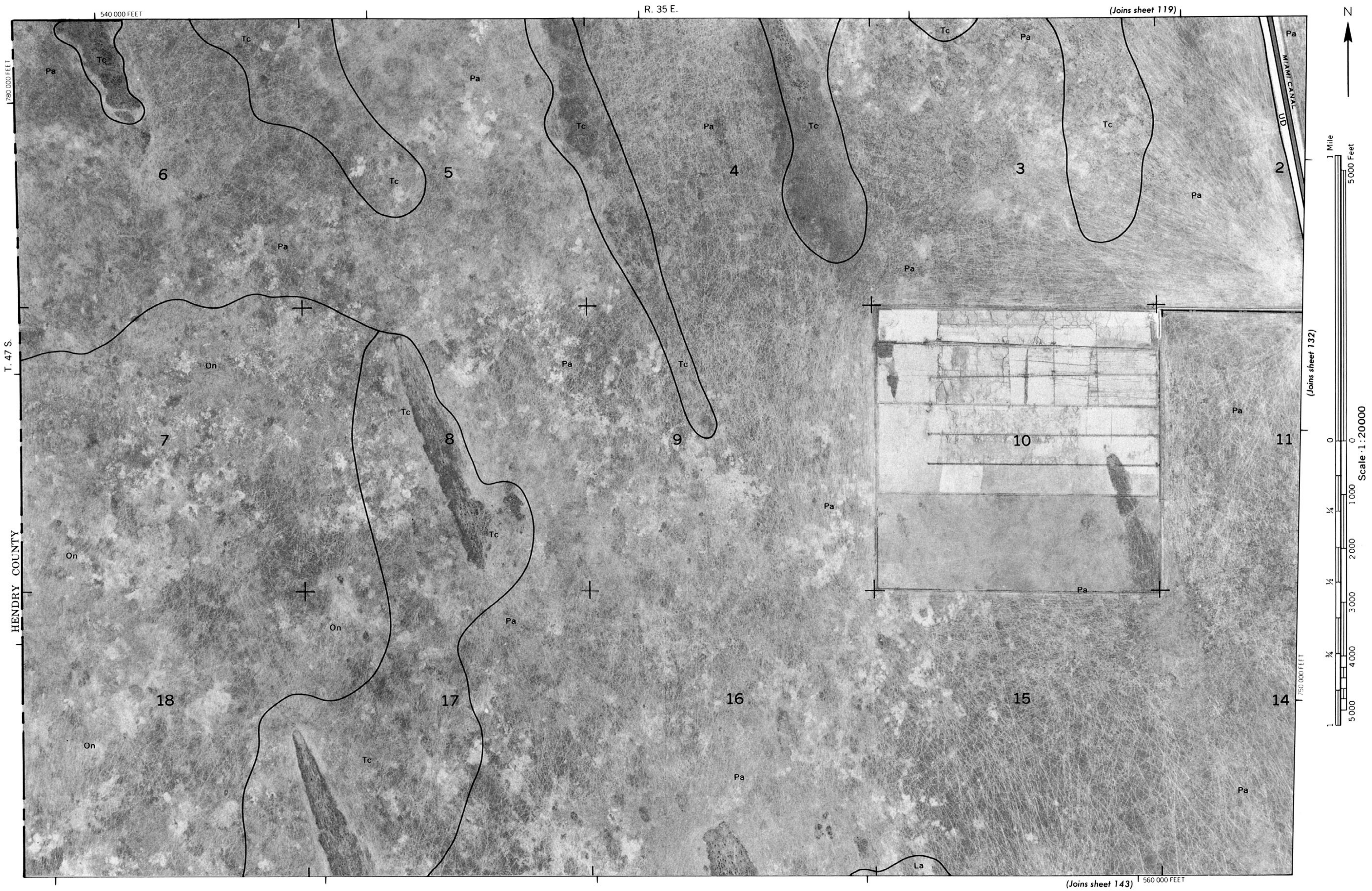
Scale 1:20000

1 Mile | 5000 Feet
0 | 0
¼ | 1000
½ | 2000
¾ | 3000
1 | 4000
 | 5000

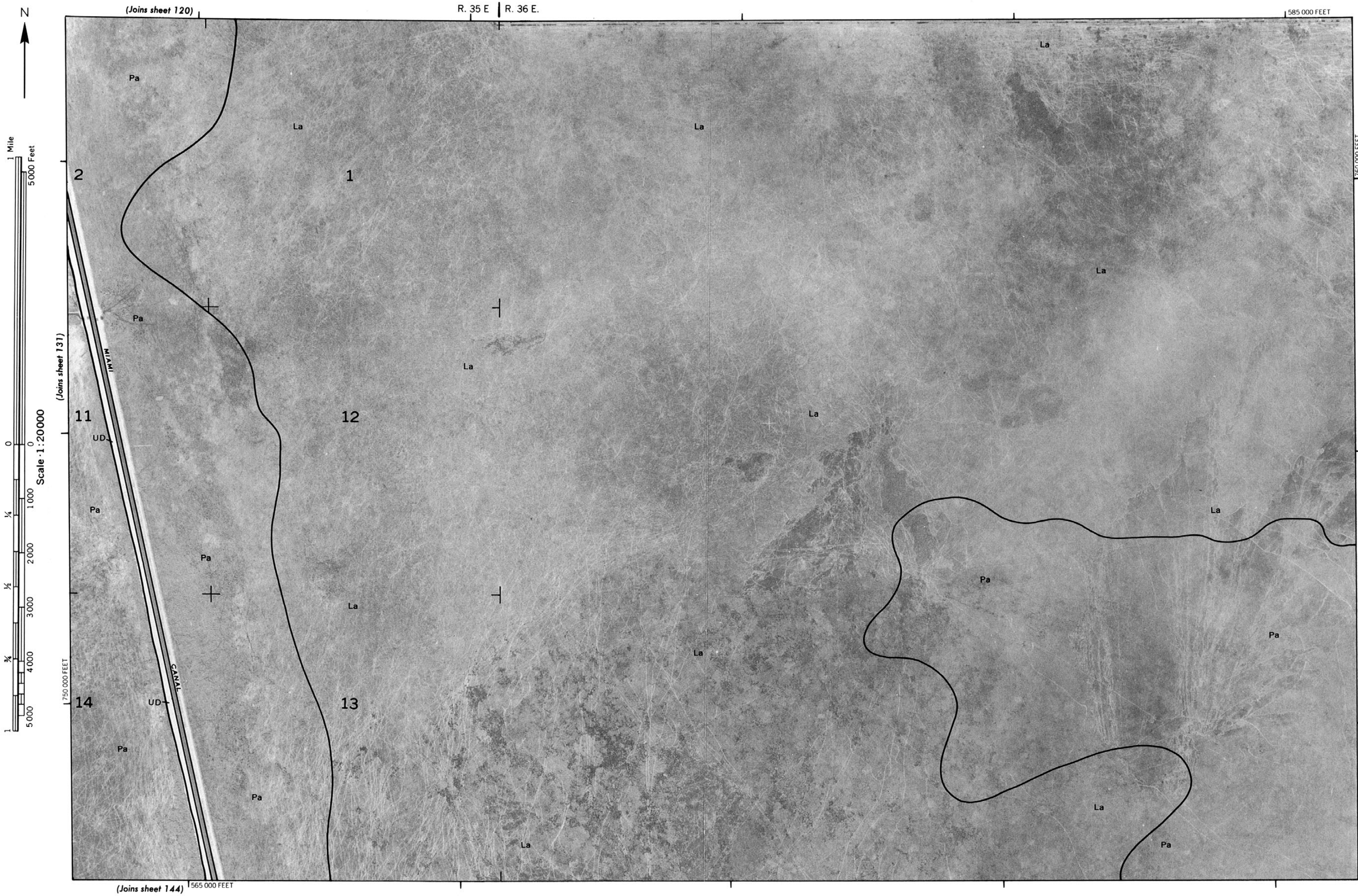

R. 41 E.
R. 42 E.
770 000 FEET
780 000 FEET
750 000 FEET
770 000 FEET
(Joins sheet 116)
(Joins sheet 140)
(Joins sheet 127)
(Joins sheet 129)
T. 46 S.
N
1 Mile
5000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000
LOXAHATCHEE
NATIONAL
WILDLIFE
REFUGE
CONSERVATION
AREA
NO. 1
LIMIT OF SOIL SURVEY
L-40
CANAL
STATE
PARKWAY
SUNSHINE
441
7
12
7
8
13
18
17
24
19
20
Os
Im
Mk
On
BM
AU
An
Wa
UD
QAB
Ba
Da
Bo
Ra
Rd


775 000 FEET
R. 42 E.
(Joins sheet 117)
780 000 FEET
T. 46 S.
(Joins sheet 128)
(Joins sheet 130)
(Joins sheet 141)
790 000 FEET
770 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
SANITARY LANDFILL
QAB
9
10
11
12
13
14
15
16
21
22
23
24
806
809

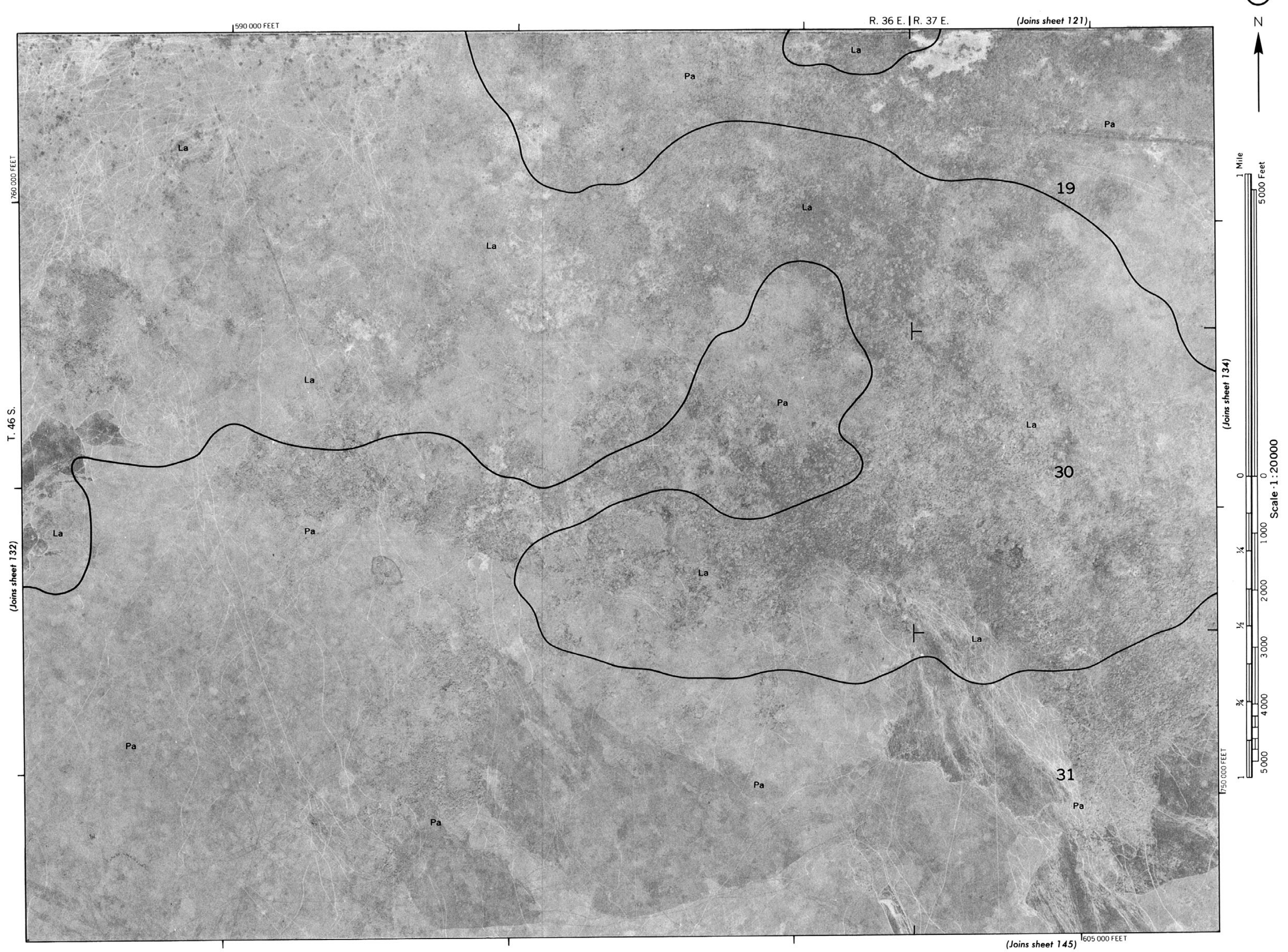

N
(Joins sheet 118)
R. 43 E.
815 000 FEET
780 000 FEET
(Joins sheet 129)
T. 46 S.
770 000 FEET
795 000 FEET
(Joins sheet 142)
1 Mile
5000 Feet
Scale 1:20000
Lake Ida
DELRAY BEACH
ATLANTIC OCEAN
EL RIO CANAL
SEABOARD COAST LINE
FLORIDA EAST COAST
INTRACOASTAL WATERWAY
water
7
8
9
16
17
18
19
20
21


131
N
540 000 FEET
R. 35 E.
(Joins sheet 119)
280 000 FEET
T. 47 S.
HENDRY COUNTY
(Joins sheet 132)
(Joins sheet 143)
560 000 FEET
750 000 FEET
MIAMI CANAL
UD
Scale 1:20000
1 Mile
5000 Feet
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18
Pa
Tc
On
La

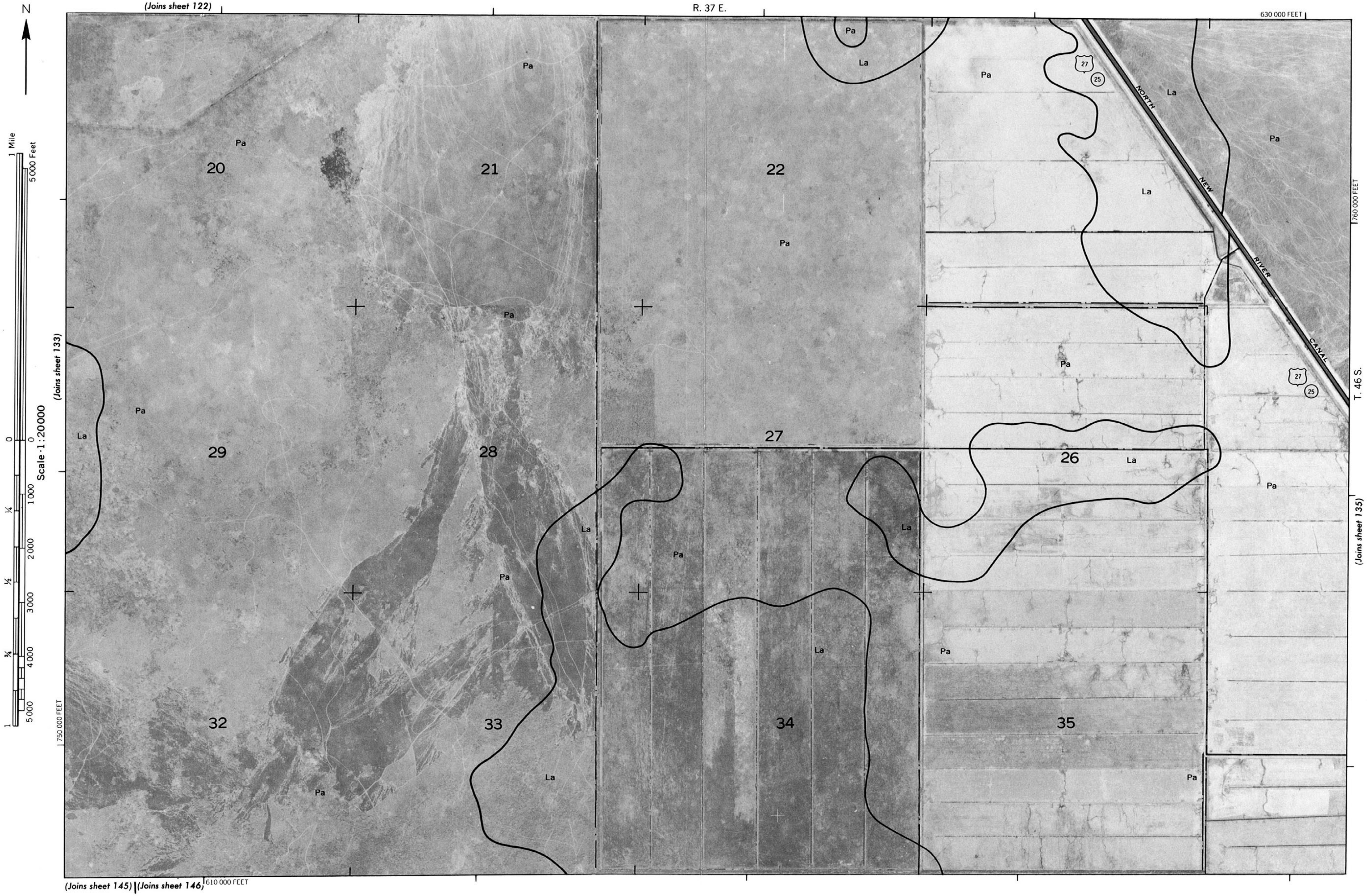
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 132

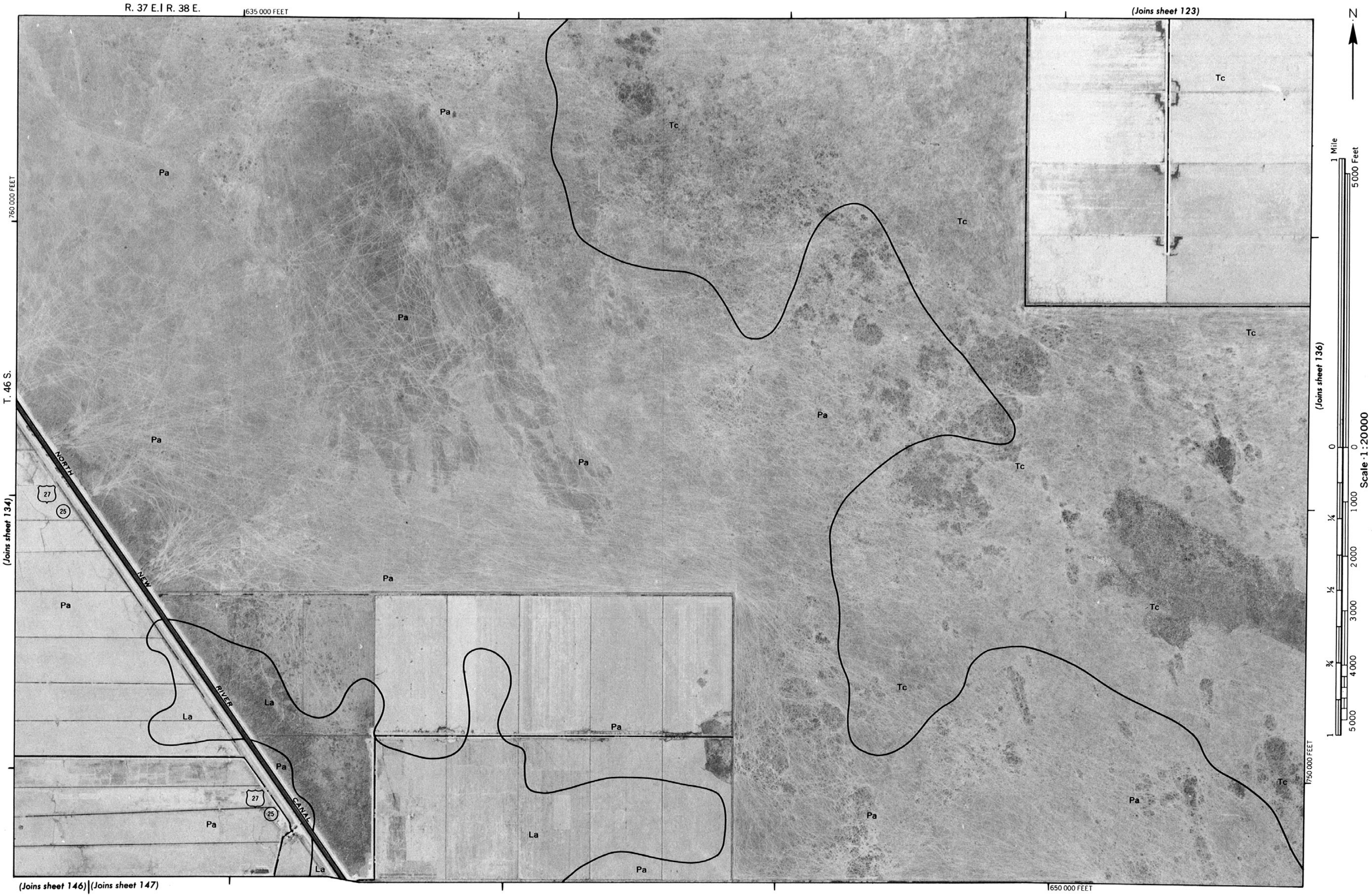


PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 133

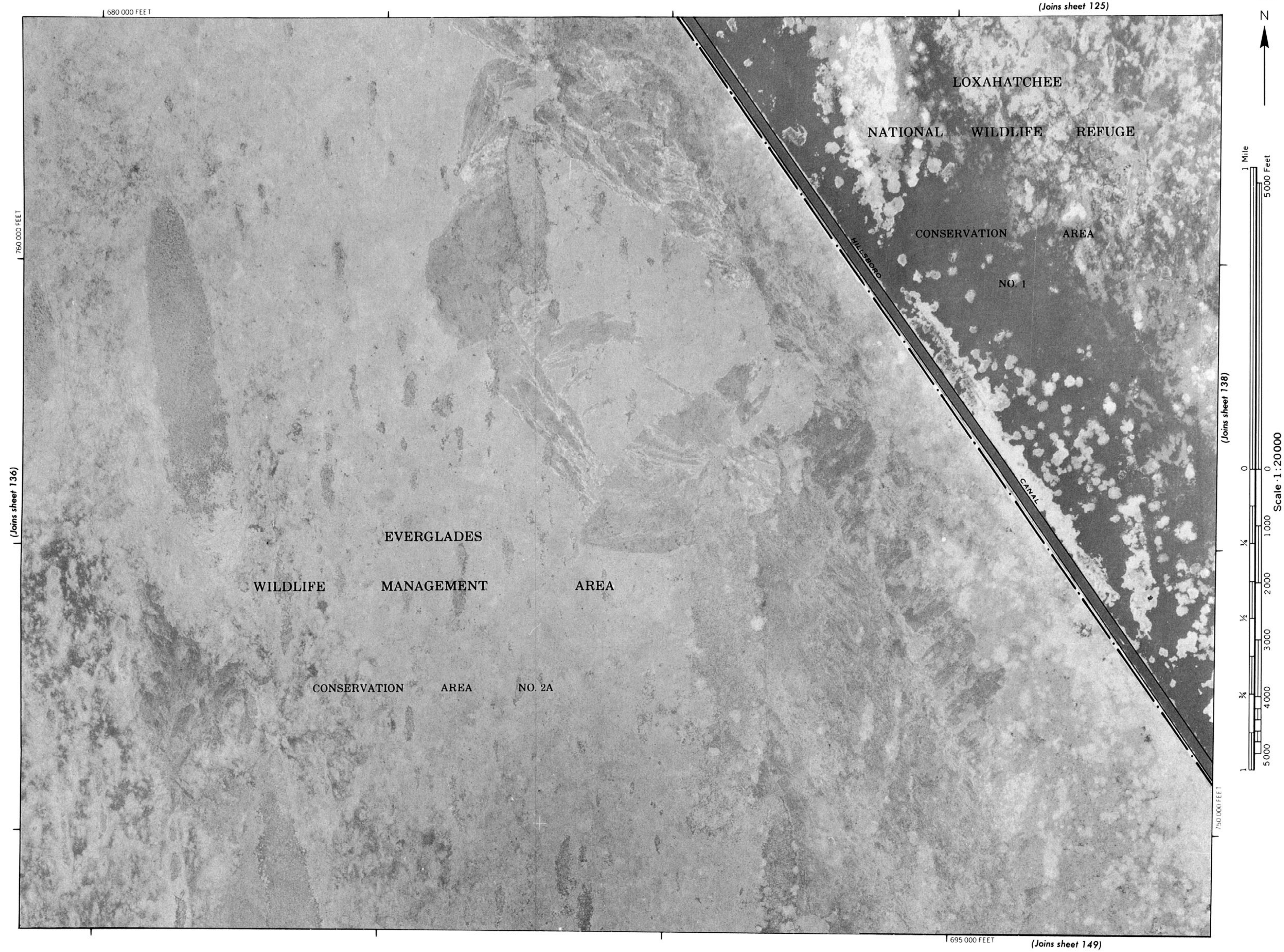


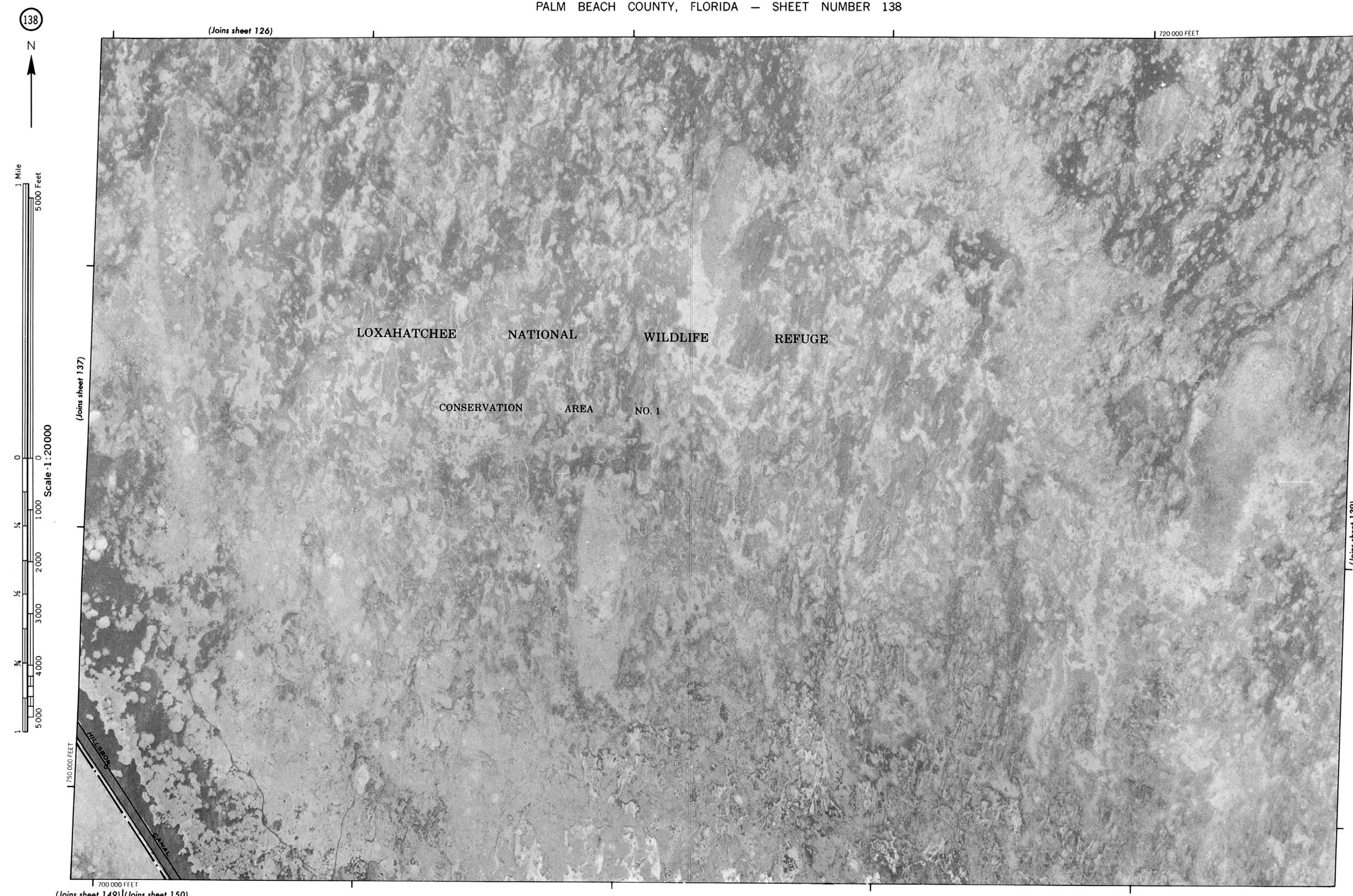
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 134




R. 37 E. | R. 38 E.
635 000 FEET
(Joins sheet 123)
N
760 000 FEET
T. 46 S.
(Joins sheet 134)
(Joins sheet 136)
(Joins sheet 146)
(Joins sheet 147)
650 000 FEET
750 000 FEET
NORTH NEW RIVER CANAL
27
25
Pa
Tc
La
1 Mile
5000 Feet
Scale 1:20000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 136


680 000 FEET
(Joins sheet 125)
N
LOXAHATCHEE
NATIONAL WILDLIFE REFUGE
CONSERVATION AREA
NO. 1
HILLSBORO
CANAL
760 000 FEET
(Joins sheet 136)
(Joins sheet 138)
EVERGLADES
WILDLIFE MANAGEMENT AREA
CONSERVATION AREA NO. 2A
750 000 FEET
695 000 FEET
(Joins sheet 149)
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000


138
N
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000
(Joins sheet 126)
720 000 FEET
765 000 FEET
(Joins sheet 137)
(Joins sheet 139)
750 000 FEET
700 000 FEET
(Joins sheet 149)
(Joins sheet 150)
LOXAHATCHEE NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
HILLSBORO CANAL


139
725 000 FEET
(Joins sheet 127)
765 000 FEET
N
LOXAHATCHEE NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
(Joins sheet 138)
(Joins sheet 140)
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000
750 000 FEET
(Joins sheet 150)
(Joins sheet 151)
745 000 FEET

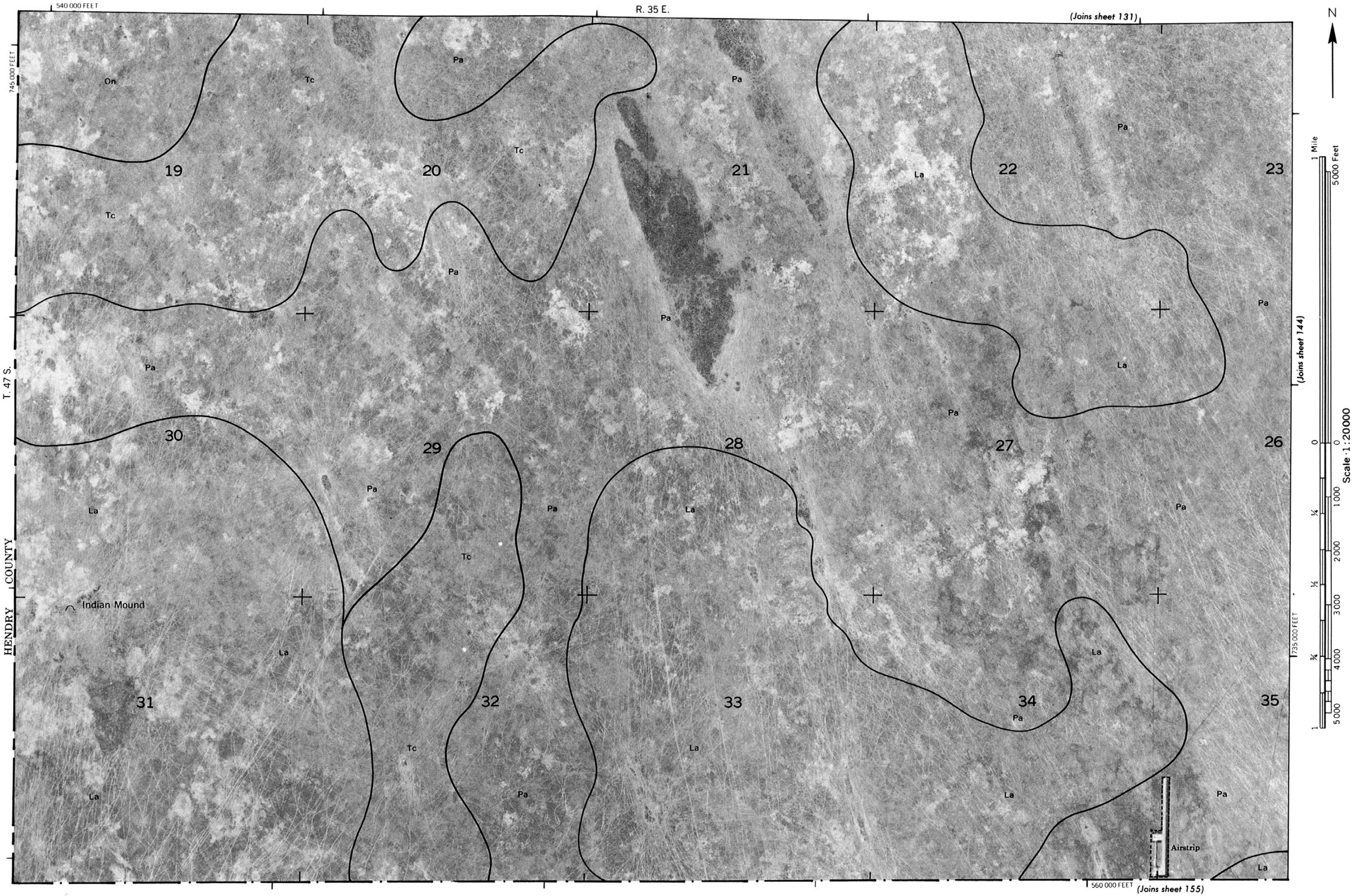

140
N
(Joins sheet 128)
R. 41 E. | R. 42 E.
770 000 FEET
765 000 FEET
LOXAHATCHEE
NATIONAL WILDLIFE
REFUGE
CONSERVATION
AREA NO. 1
LIMIT OF SOIL SURVEY
L-40 CANAL
UD
(Joins sheet 139)
(Joins sheet 141)
(Joins sheet 152)
750 000 FEET
Scale 1:20000
1 Mile
5 000 Feet
STATE PARKWAY
SUNSHINE
T. 46 S.
T. 47 S.
26
25
30
29
35
36
31
32
2
1
6
5
On
Os
Rd
Ur
BM
Mk
Bo
Im
La
Ho
Pg
An
Fa
Pf
Wa
Ba
water
w
7
441

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 141


N
(Joins sheet 130)
R. 43 E.
815 000 FEET
765 000 FEET
(Joins sheet 141)
(Joins sheet 154)
795 000 FEET
750 000 FEET
T. 46 S.
T. 47 S.
Scale 1:20 000
1 Mile
5000 Feet
ATLANTIC
OCEAN
Tropic Isle Harbor
Highland Beach
INTRACOASTAL
WATERWAY
FLORIDA
EAST
COAST
LINE
SEABOARD
EL RIO
CANAL

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 143

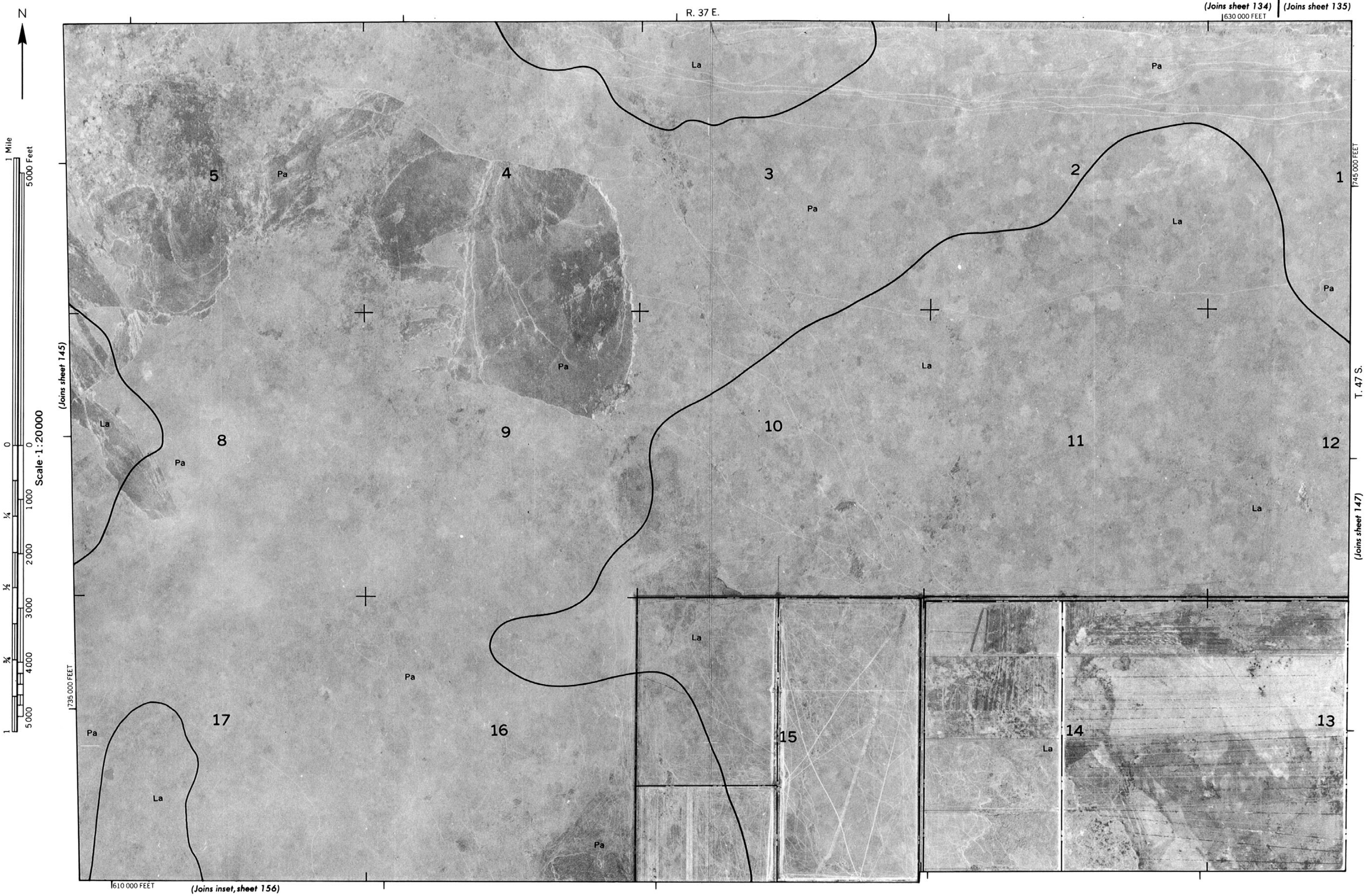
143




N
1 Mile
5000 Feet
0
0
Scale 1:20000
1000
¼
2000
½
3000
¾
4000
5000
1
(Joins sheet 132)
R. 35 E.
R. 36 E.
585 000 FEET
745 000 FEET
T. 47 S.
(Joins sheet 143)
(Joins sheet 145)
735 000 FEET
565 000 FEET
(Joins inset, sheet 155)
MIAMI
CANAL
UD
23
24
25
26
35
36
Pa
La

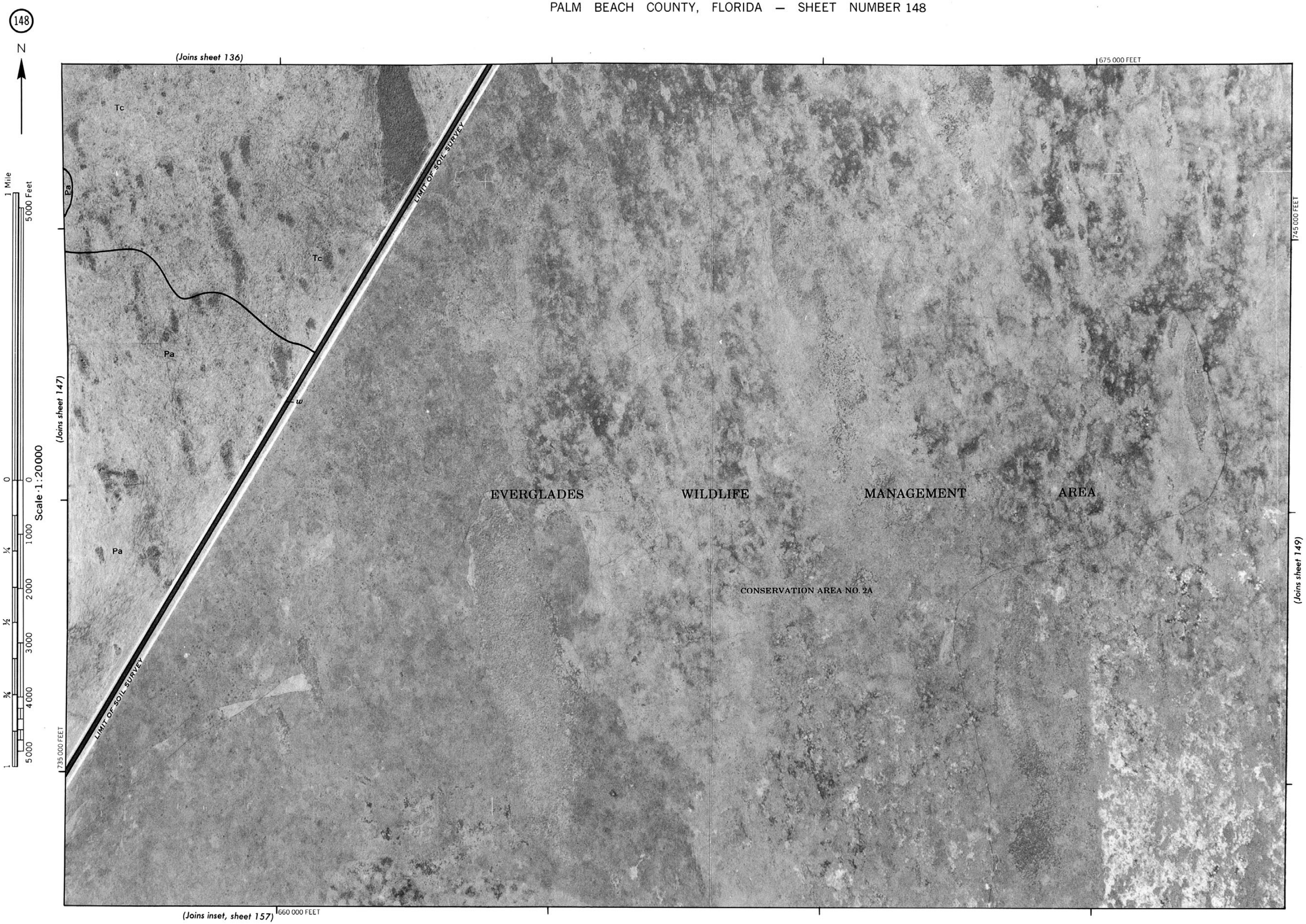

145
N
590 000 FEET
R. 36 E.
R. 37 E.
(Joins sheet 133)
(Joins sheet 134)
745 000 FEET
T. 47 S.
(Joins sheet 144)
(Joins sheet 146)
(Joins sheet 156)
605 000 FEET
735 000 FEET
Pa
La
6
7
18
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 146



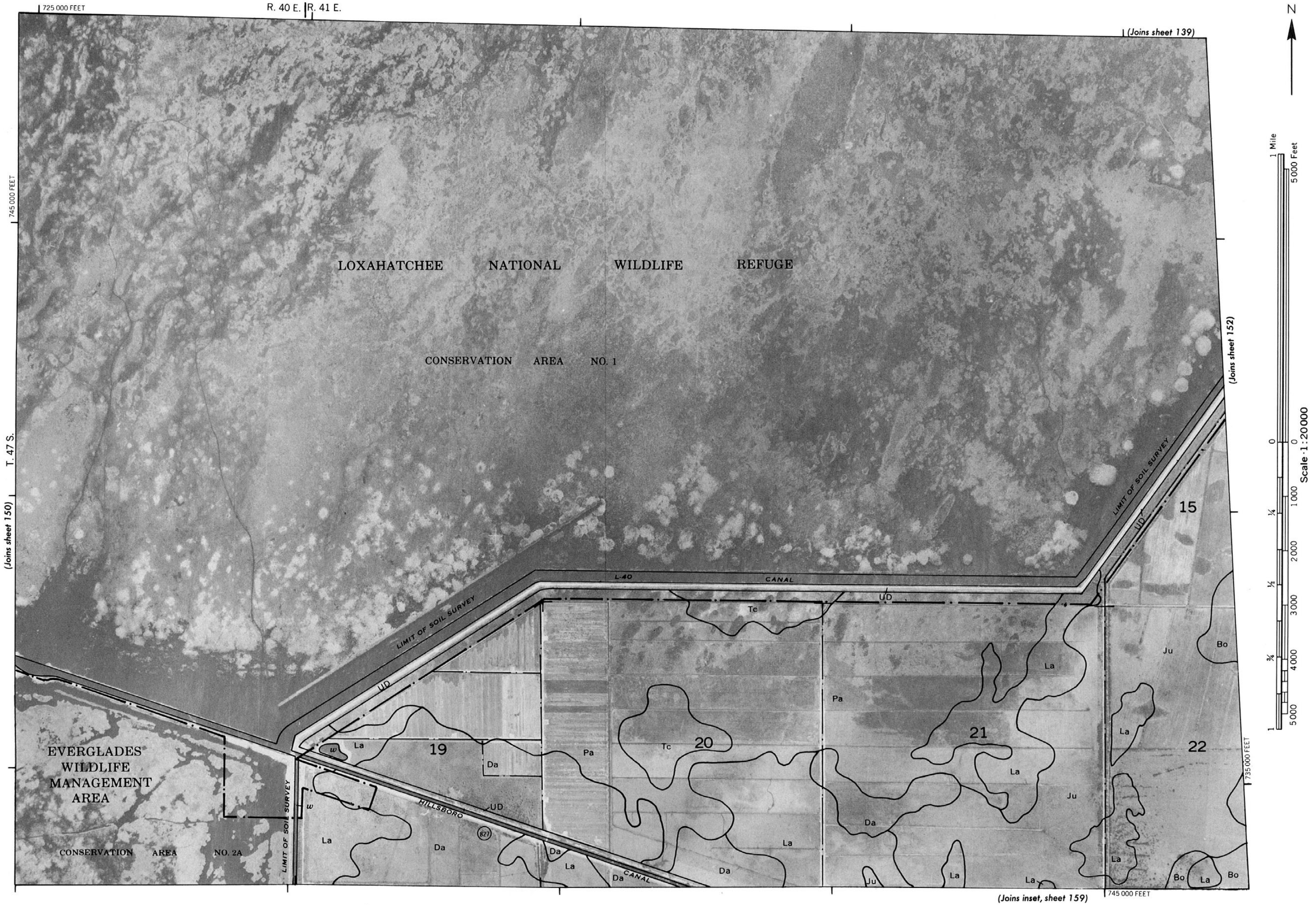

R. 37 E. | R. 38 E.
635 000 FEET
(Joins sheet 135)
(Joins sheet 136)
N
745 000 FEET
T. 47 S.
(Joins sheet 146)
(Joins sheet 148)
(Joins sheet 157)
735 000 FEET
655 000 FEET
1 Mile
5000 Feet
Scale 1:20000
NORTH NEW RIVER CANAL
LIMIT OF SOIL SURVEY
27
25
1
4
5
6
7
8
9
10
12
13
16
17
18
La
Pa
Pf
Tc
w

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 148



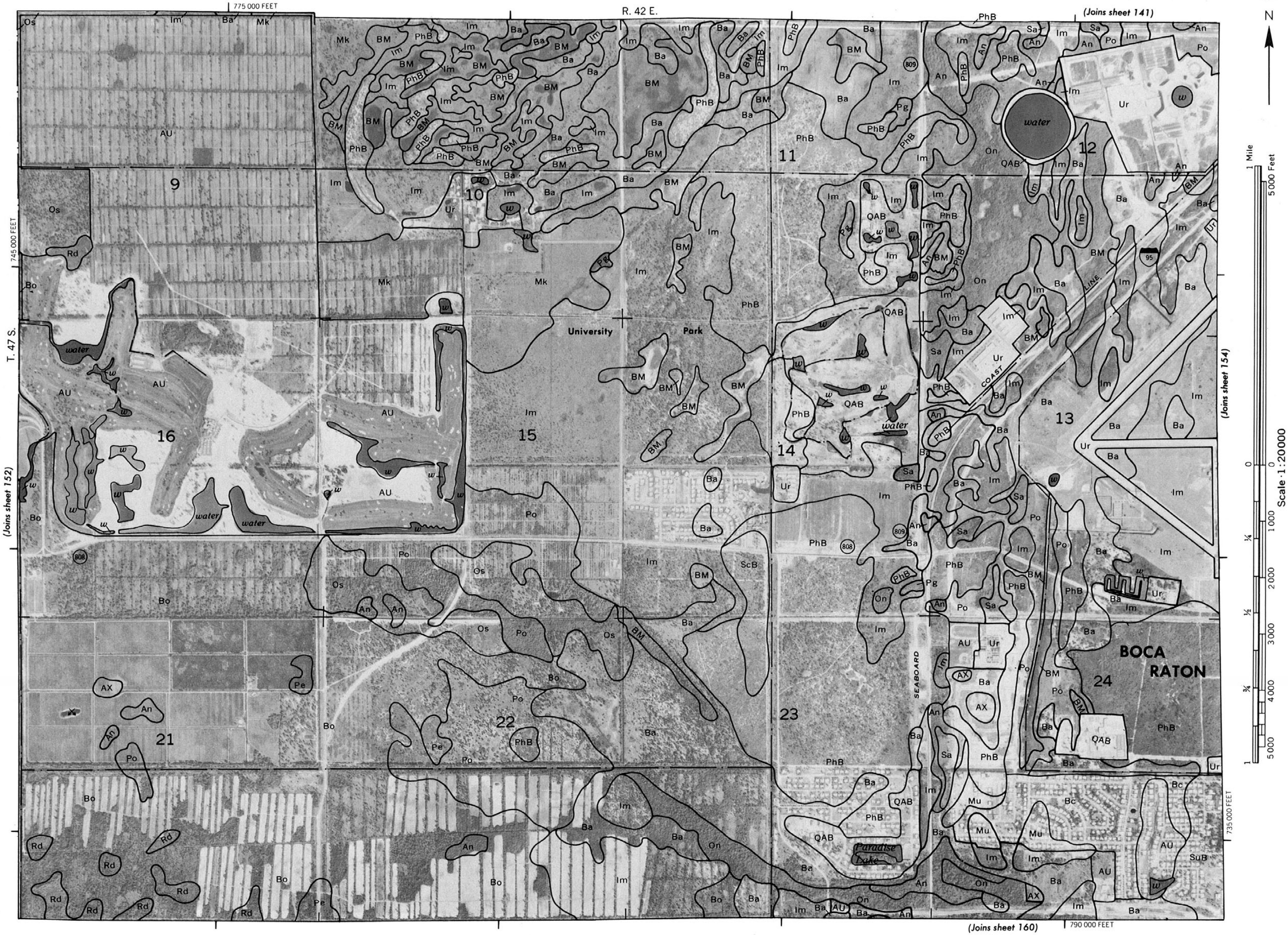

(Joins sheet 137)
sheet 138)
680 000 FEET
745 000 FEET
(Joins sheet 148)
(Joins sheet 150)
EVERGLADES WILDLIFE MANAGEMENT AREA
CONSERVATION AREA NO. 2A
735 000 FEET
(Joins sheet 158)
700 000 FEET
N
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000

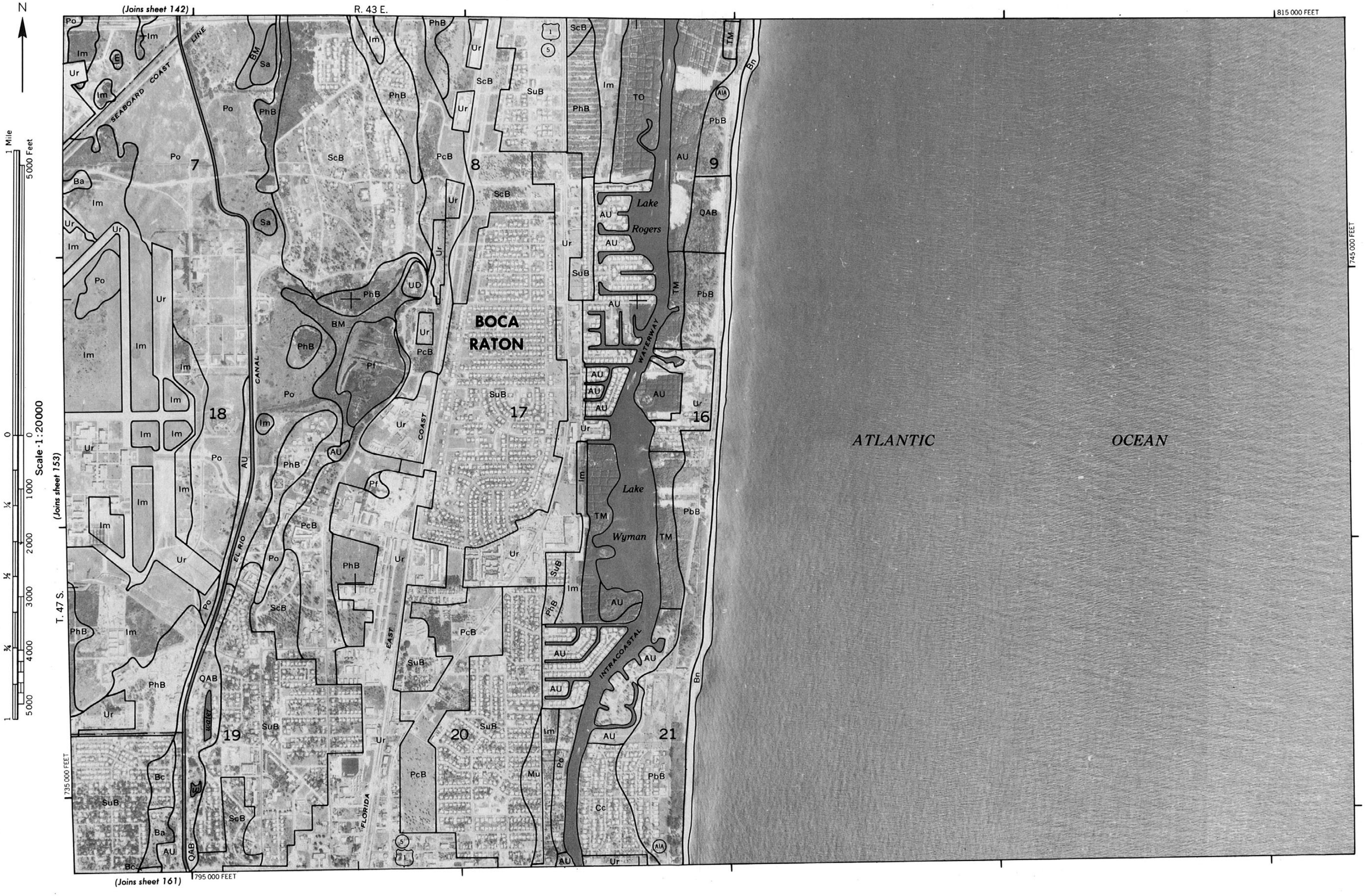

N
1 Mile
5000 Feet
0
0
Scale 1:20000
1000
¼
2000
½
3000
¾
4000
1
5000
720 000 FEET
(Joins sheet 138)
139
745 000 FEET
(Joins sheet 149)
(Joins sheet 151)
735 000 FEET
705 000 FEET
(Joins inset, sheet 158)
LOXAHATCHEE
NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
HILLSBORO
CANAL
EVERGLADES WILDLIFE MANAGEMENT AREA
CONSERVATION AREA NO. 2A



725 000 FEET
R. 40 E.
R. 41 E.
(Joins sheet 139)
745 000 FEET
T. 47 S.
(Joins sheet 150)
(Joins sheet 152)
LOXAHATCHEE NATIONAL WILDLIFE REFUGE
CONSERVATION AREA NO. 1
LIMIT OF SOIL SURVEY
L-40 CANAL
UD
Tc
Pa
La
Ju
Bo
15
19
20
21
22
Da
w
EVERGLADES WILDLIFE MANAGEMENT AREA
CONSERVATION AREA NO. 2A
HILLSBORO CANAL
827
735 000 FEET
745 000 FEET
(Joins inset, sheet 159)
N
1 Mile
5000 Feet
Scale 1:20000

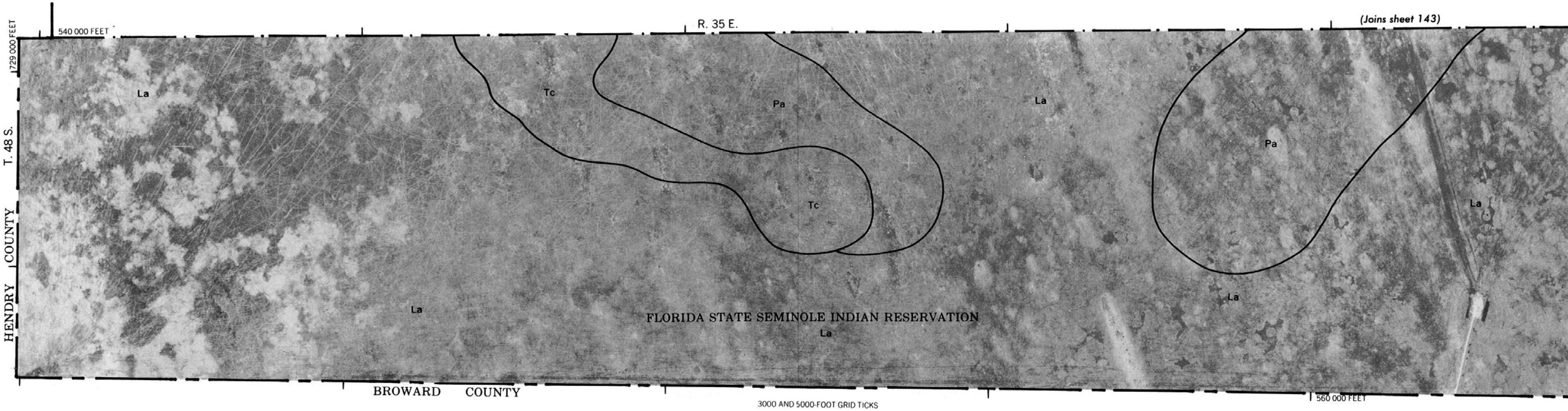

N
1 Mile
5 000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000
(Joins sheet 140)
(Joins sheet 151)
(Joins sheet 153)
(Joins sheet 159)
R. 41 E.
R. 42 E.
770 000 FEET
745 000 FEET
750 000 FEET
735 000 FEET
T. 47 S.
LOXAHATCHEE
NATIONAL
WILDLIFE REFUGE
CONSERVATION AREA
NO. 1
LIMIT OF SOIL SURVEY
CANAL
L-40
UD
STATE
SUNSHINE
PARKWAY
441
7
808
11
12
13
14
15
7
8
17
18
19
20
22
23
24
La
Os
Ho
Bo
Rd
Fa
Ha
Ju
Ch
On
Ur
Wa
Ra
Sa
An
W
ASF

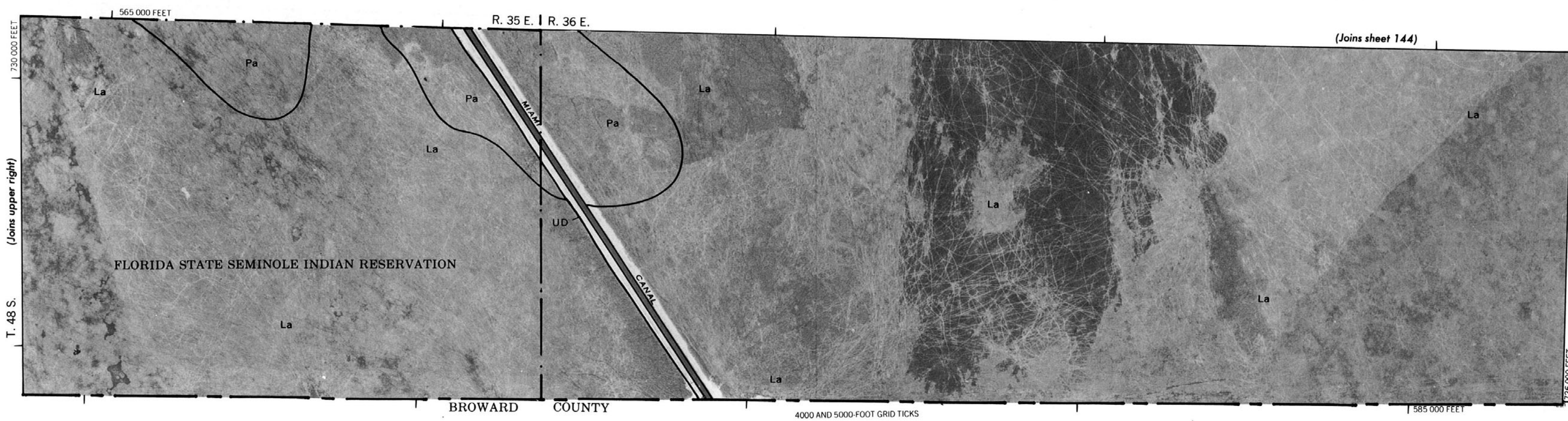

153
N
775 000 FEET
R. 42 E.
(Joins sheet 141)
745 000 FEET
T. 47 S.
(Joins sheet 152)
(Joins sheet 154)
(Joins sheet 160)
790 000 FEET
735 000 FEET
University
Park
BOCA
RATON
SEABOARD
COAST
LINE
water
Paradise
Lake
808
809
95
9
10
11
12
13
14
15
16
21
22
23
24
1 Mile
5000 Feet
Scale 1:20000


N
(Joins sheet 142)
R. 43 E.
815 000 FEET
745 000 FEET
735 000 FEET
795 000 FEET
(Joins sheet 161)
(Joins sheet 153)
T. 47 S.
Scale 1:20000
1 Mile
5000 Feet
BOCA RATON
ATLANTIC OCEAN
Lake Rogers
Lake Wyman
INTRACOASTAL WATERWAY
EL RIO CANAL
SEABOARD COAST LINE
FLORIDA EAST COAST
7
8
9
16
17
18
19
20
21

155

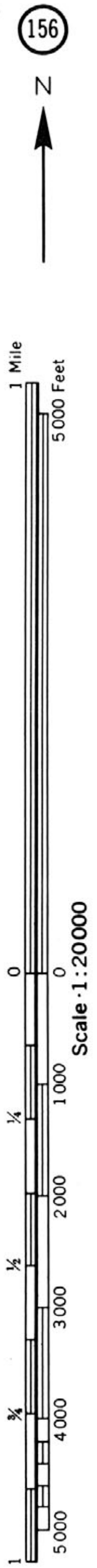
N

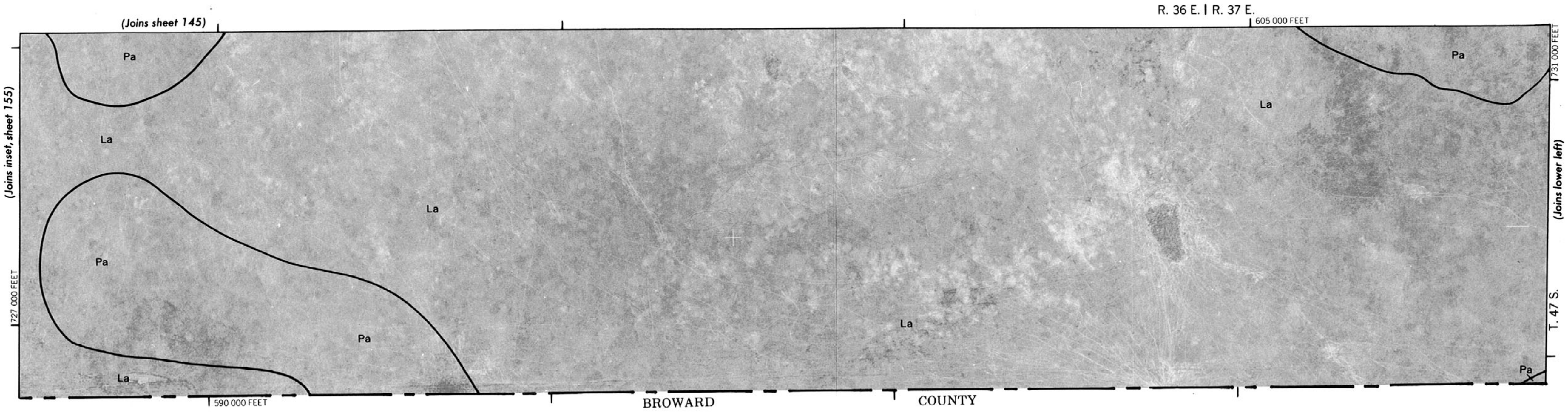




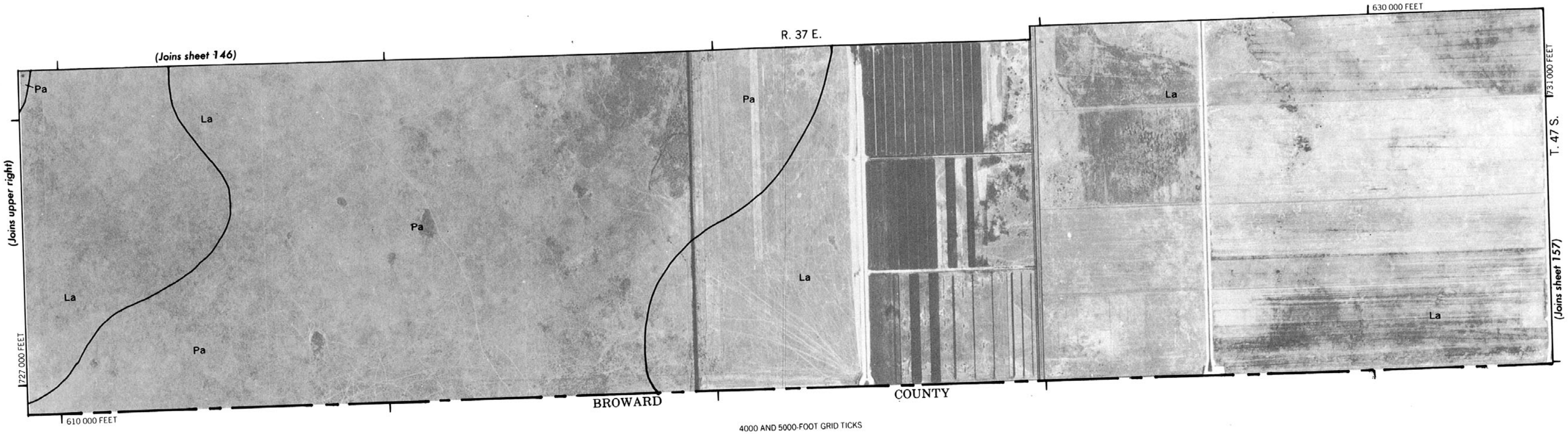
1 Mile
5 000 Feet
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

Scale 1:20000



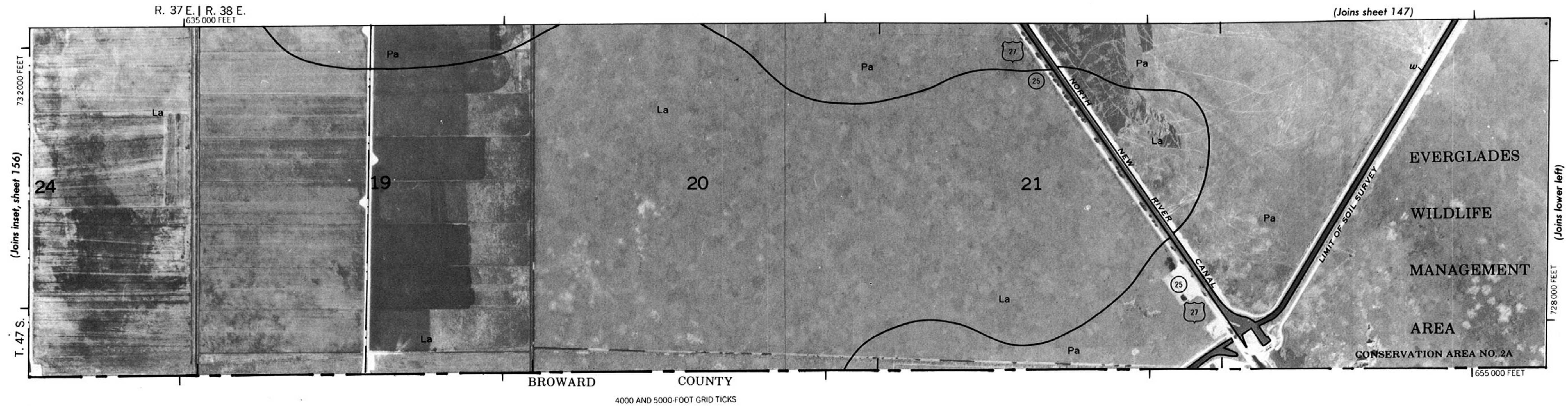


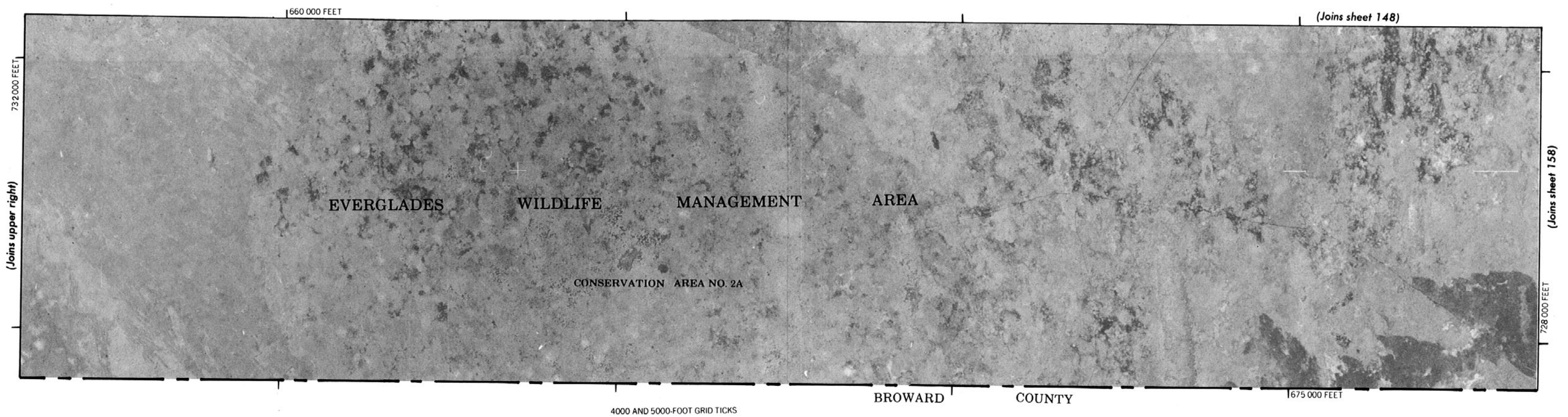
4000 AND 5000-FOOT GRID TICKS

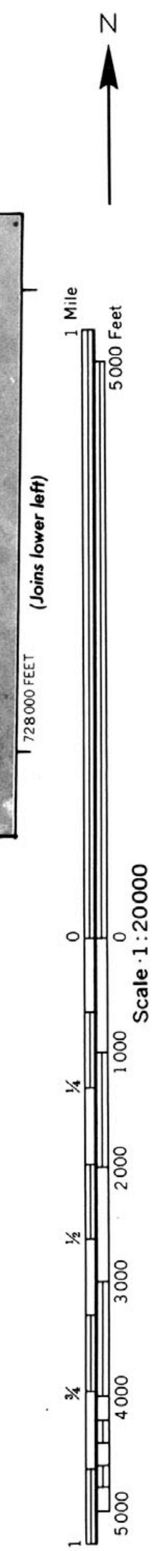


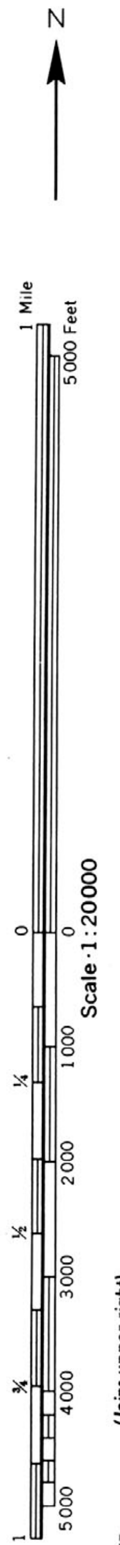
4000 AND 5000-FOOT GRID TICKS

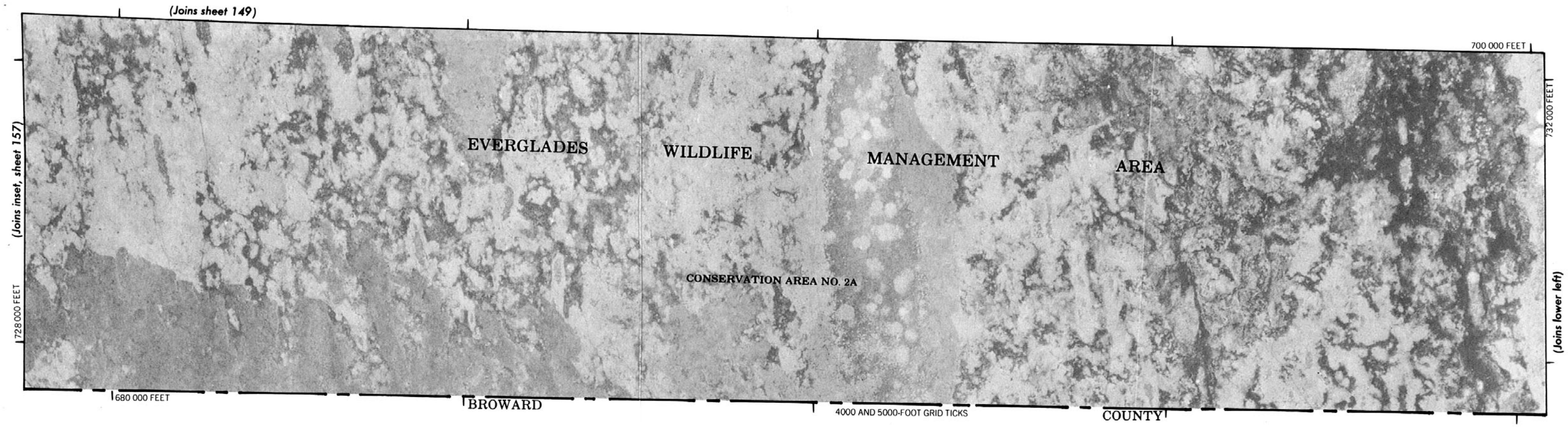
PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 157

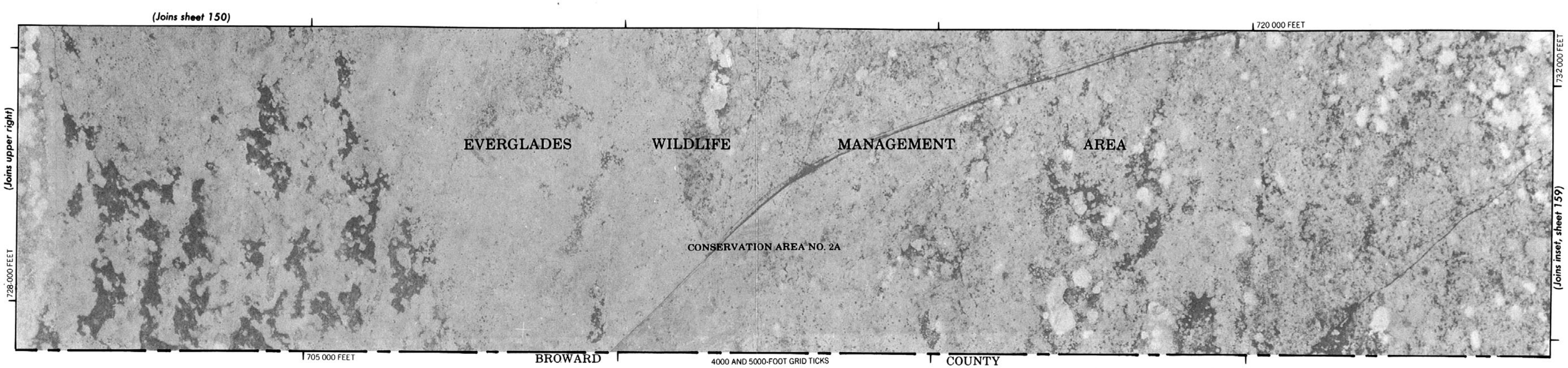


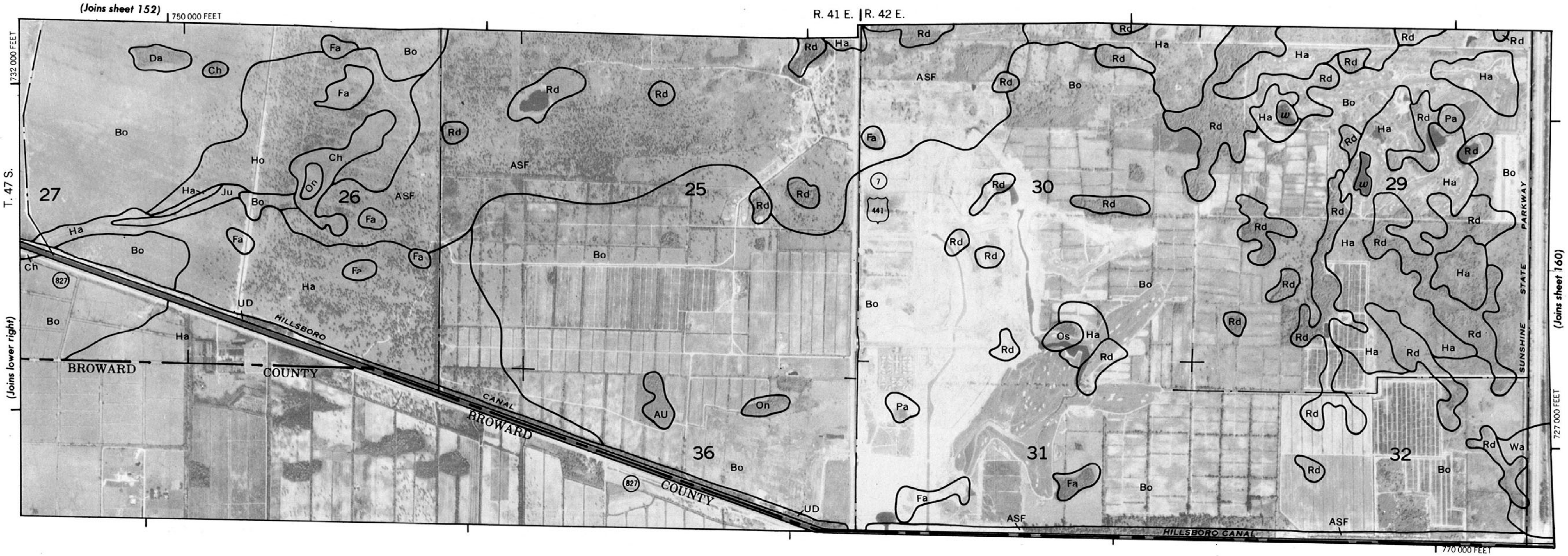


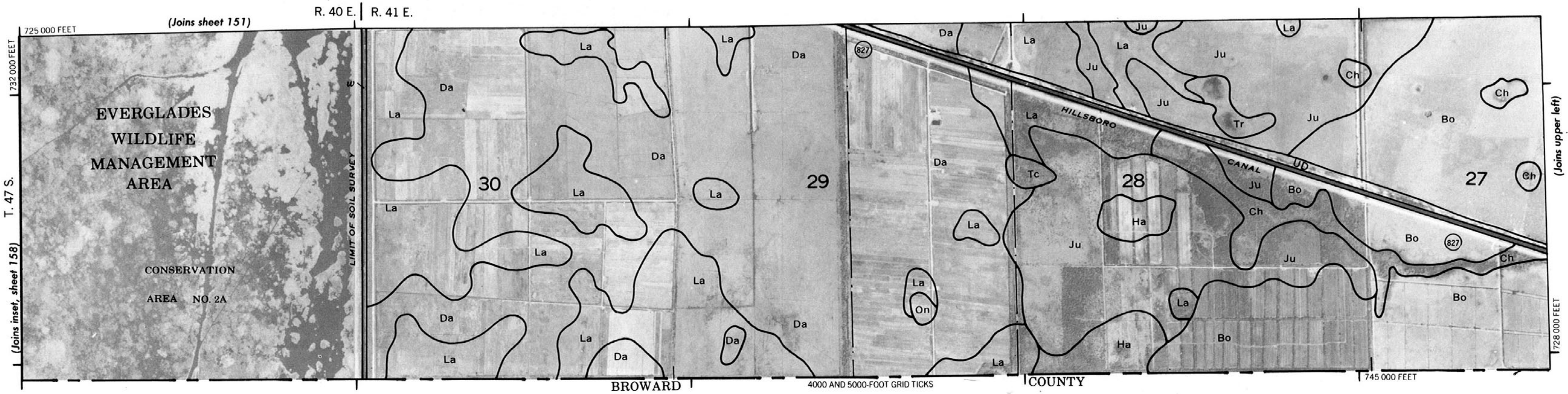



N
1 Mile
5000 Feet
0
0
1000
¼
2000
½
3000
¾
4000
1
5000
Scale 1:20000


(Joins sheet 149)
700 000 FEET
(Joins inset, sheet 157)
732 000 FEET
EVERGLADES WILDLIFE MANAGEMENT AREA
CONSERVATION AREA NO. 2A
728 000 FEET
(Joins lower left)
680 000 FEET
BROWARD
4000 AND 5000-FOOT GRID TICKS
COUNTY

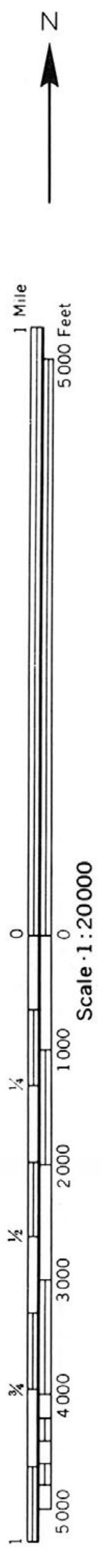

(Joins sheet 150)
720 000 FEET
732 000 FEET
(Joins upper right)
EVERGLADES WILDLIFE MANAGEMENT AREA
CONSERVATION AREA NO. 2A
(Joins inset, sheet 159)
728 000 FEET
705 000 FEET
BROWARD
4000 AND 5000-FOOT GRID TICKS
COUNTY

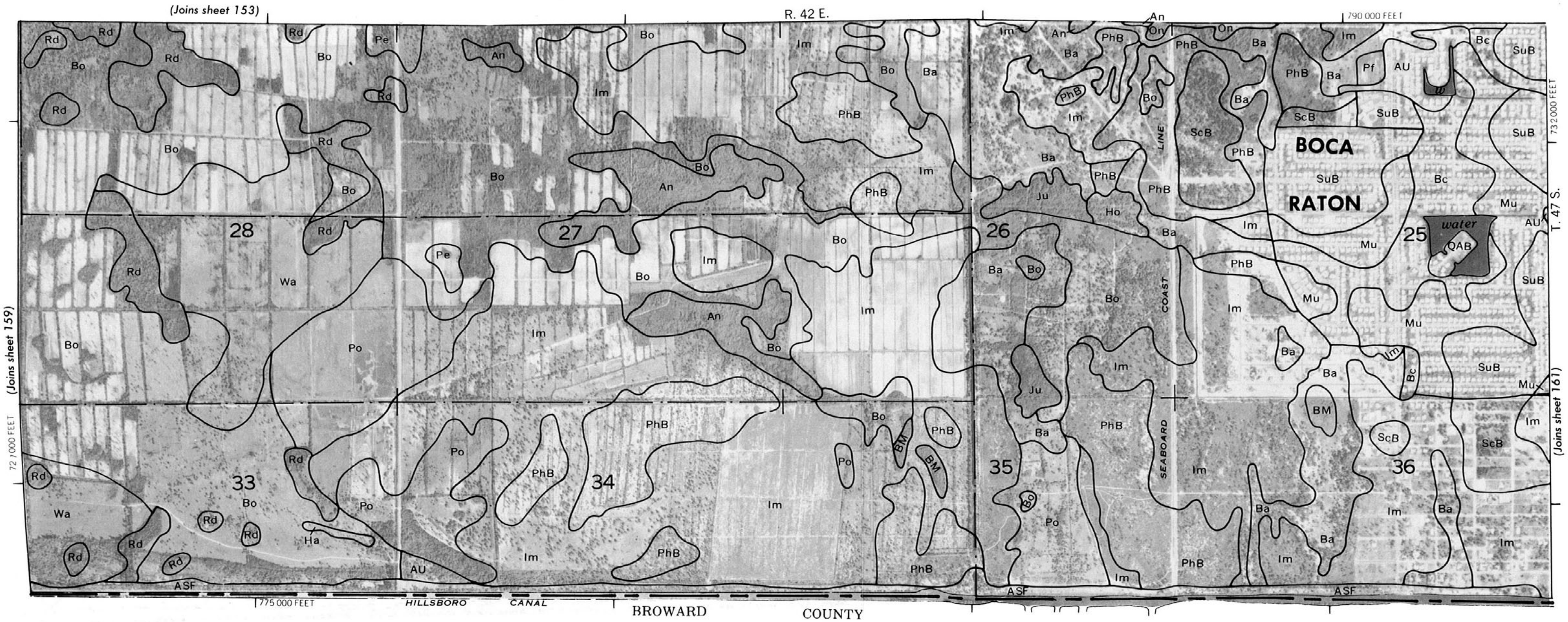

(Joins sheet 152)
750 000 FEET
732 000 FEET
R. 41 E.
R. 42 E.
T. 47 S.
(Joins lower right)
(Joins sheet 160)
727 000 FEET
770 000 FEET
27
26
25
30
29
36
31
32
BROWARD
COUNTY
HILLSBORO
CANAL
BROWARD
COUNTY
HILLSBORO CANAL
SUNSHINE STATE PARKWAY
UD
ASF
Bo
Ha
Rd
Fa
Da
Ch
Ho
Ju
On
AU
Pa
Os
Wa
827
441
7

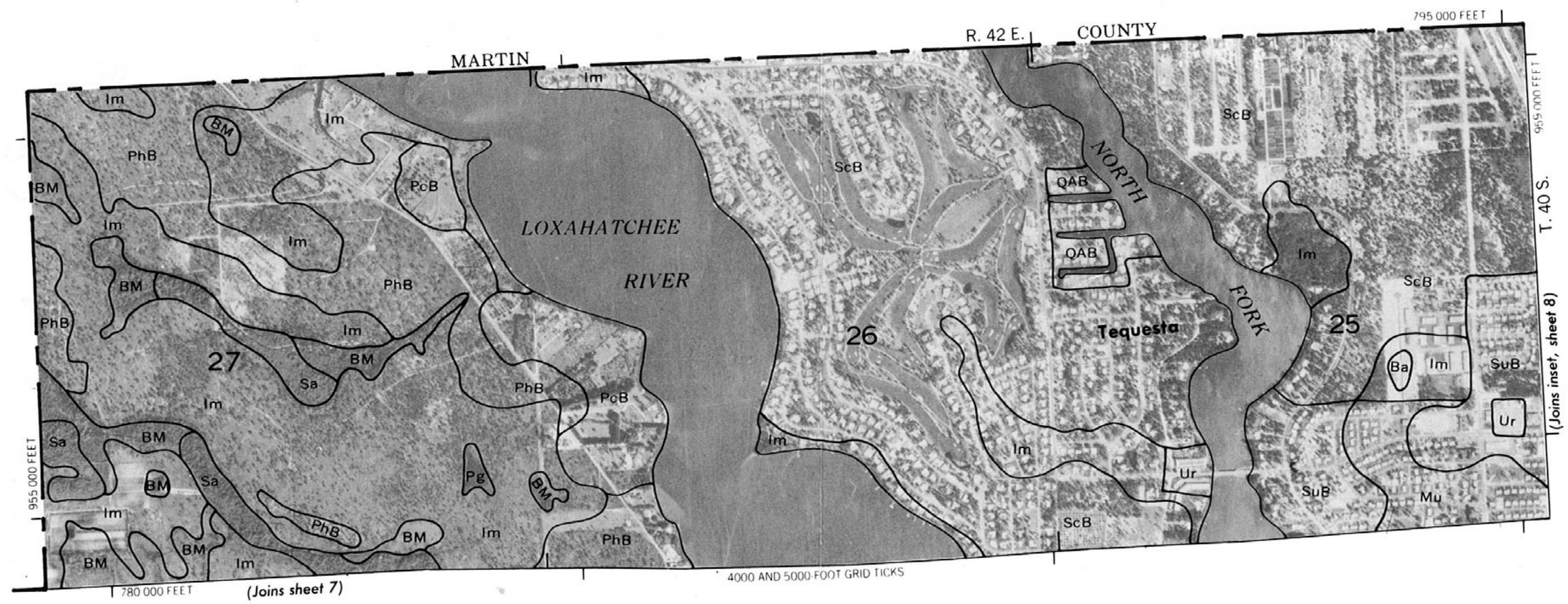

(Joins sheet 151)
725 000 FEET
732 000 FEET
R. 40 E.
R. 41 E.
T. 47 S.
(Joins inset, sheet 158)
(Joins upper left)
728 000 FEET
745 000 FEET
EVERGLADES
WILDLIFE
MANAGEMENT
AREA
CONSERVATION
AREA NO. 2A
LIMIT OF SOIL SURVEY
30
29
28
27
HILLSBORO
CANAL
UD
BROWARD
COUNTY
4000 AND 5000-FOOT GRID TICKS
Da
La
Ju
Ch
Tr
Tc
Bo
Ha
On
827

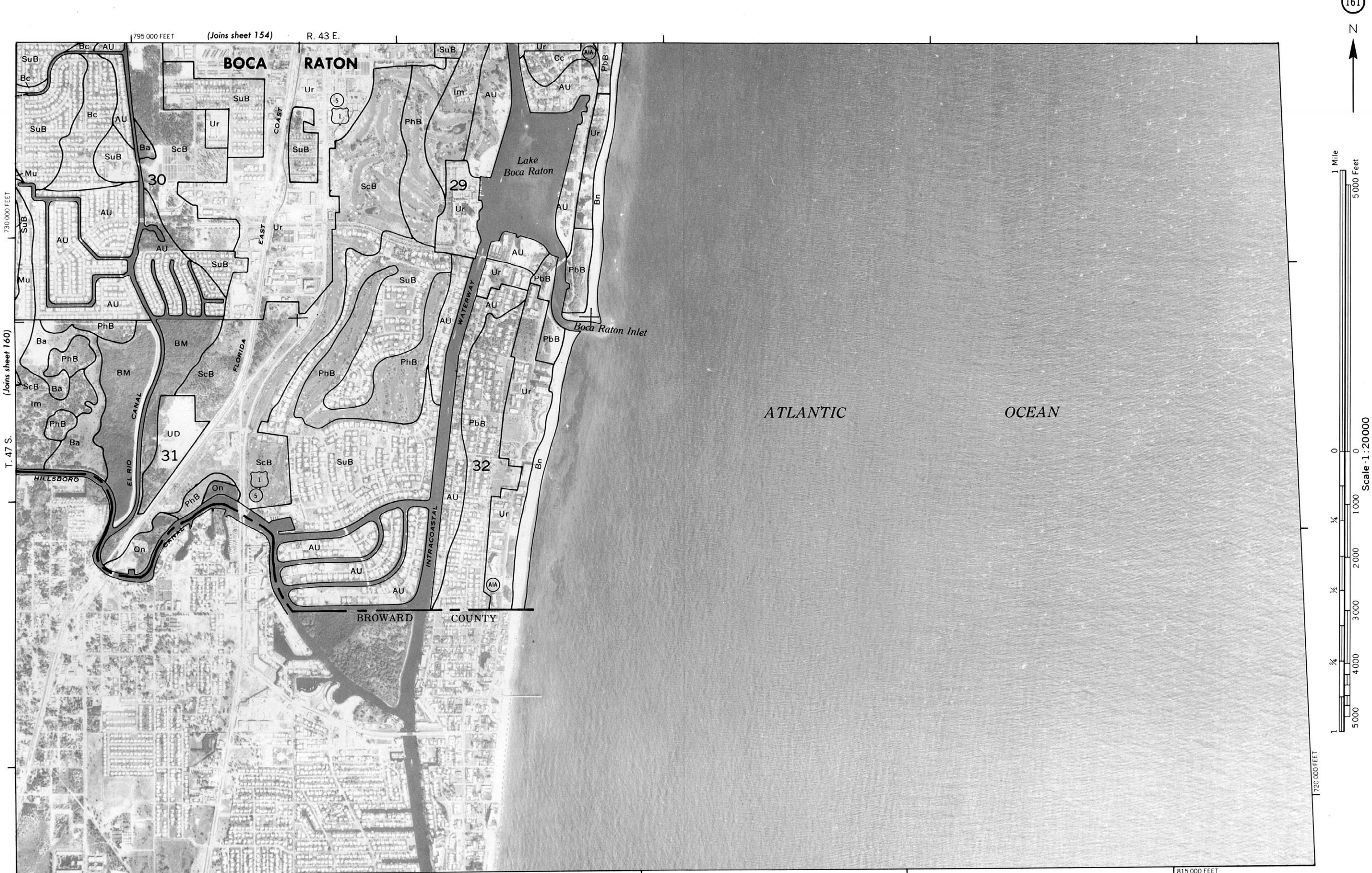

N
1 Mile
5000 Feet
Scale 1:20 000
0
1000
2000
3000
4000
5000

PALM BEACH COUNTY, FLORIDA — SHEET NUMBER 160








161
N
795 000 FEET
(Joins sheet 154)
R. 43 E.
BOCA
RATON
Lake
Boca Raton
Boca Raton Inlet
EAST
COAST
FLORIDA
INTRACOASTAL
WATERWAY
EL RIO
CANAL
HILLSBORO
CANAL
BROWARD
COUNTY
ATLANTIC
OCEAN
29
30
31
32
730 000 FEET
(Joins sheet 160)
T. 47 S.
720 000 FEET
815 000 FEET
1 Mile
5 000 Feet
Scale 1:20000